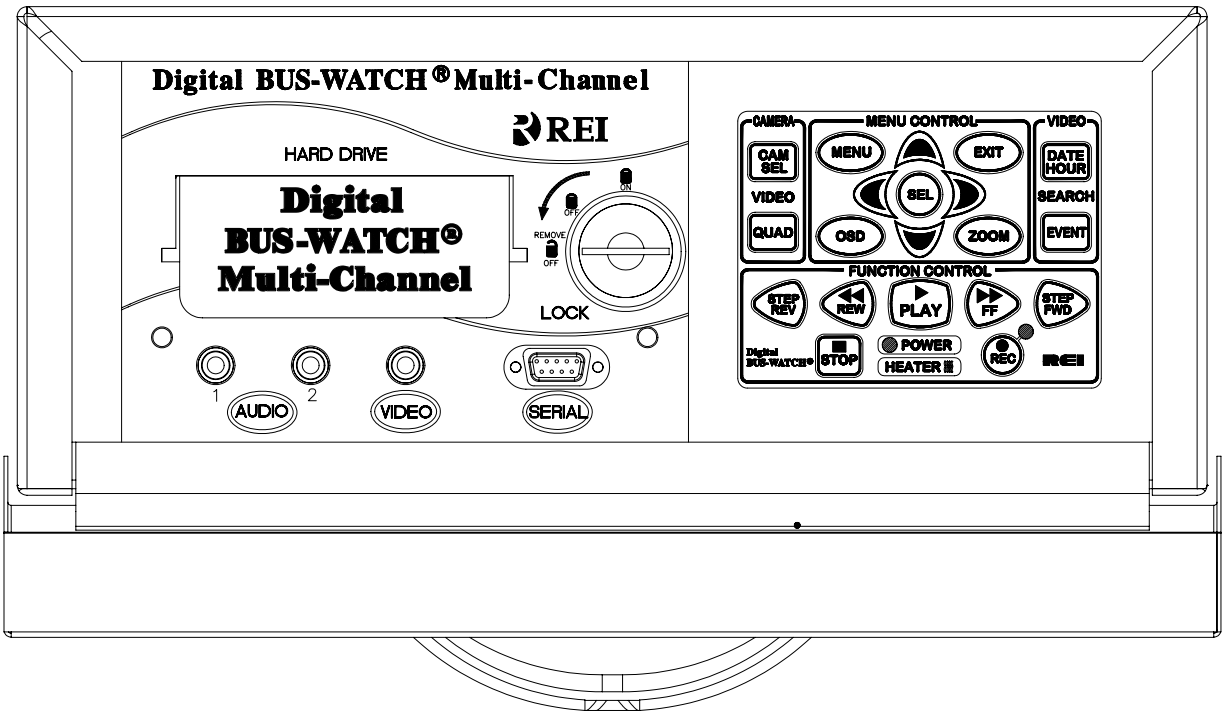
Digital BUS-WATCH® IV

User Manual
Installation Manual



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INTRODUCTION

Thank you for purchasing the Digital BUS-WATCH® IV surveillance system by Radio Engineering Industries, Inc. This manual is intended to provide the user with the information required for proper installation, initial setup and explanation of the individual programming options. If you have any questions, or need assistance, please call:

SERVICE HOT LINE
USA & CANADA
1-877-726-4617 Toll Free
1-402-339-2200

MAIN SYSTEM OVERVIEW

The Digital BUS-WATCH® IV is a superior surveillance system specifically designed for rugged school bus, mass transit, and all mobile applications. The system has smooth audio playback on 2 separate channels at all frame rates, and is GPS enabled. The system consists of an industrial grade Digital Video Recording system encased in a tamperproof, lockable steel security cabinet and surveillance cameras of sturdy steel housings. As an option, the Digital BUS-WATCH® IV can monitor and record vehicle functions such as warning lamp operation, brake, vehicle speed, and two user defined points. Figure 1 shows each component and a minimal hookup.

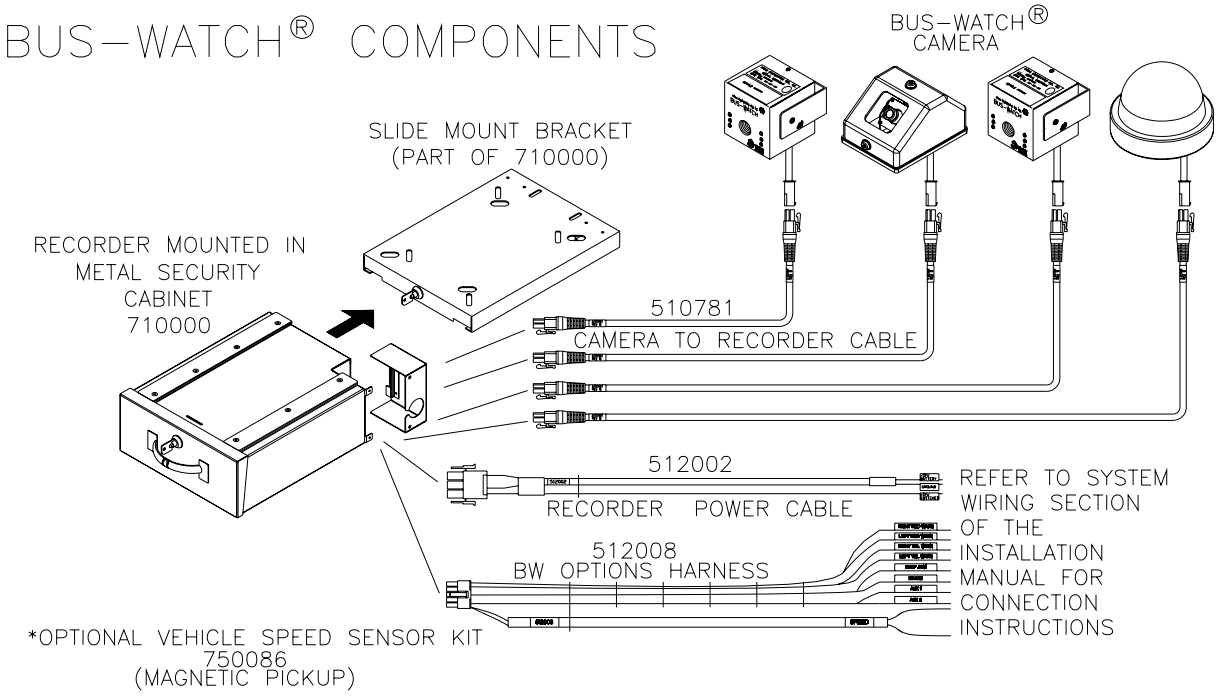


Figure 1

EXPANDED SYSTEMS OVERVIEW

Digital BUS-WATCH® IV surveillance systems are highly configurable. Figure 2 shows a connection diagram for a fully equipped 4 camera system. To be able to switch between different cameras based upon an external trigger (such as a door opening); Camera Switch Devices (P/N 700462 or 710030) can be added to the system. Camera Switch Devices and Quad Video Processors (Color P/N 700848) or (Black & White P/N 700483) can also be added to the system to be able to record and view 5 to 16 cameras simultaneously.

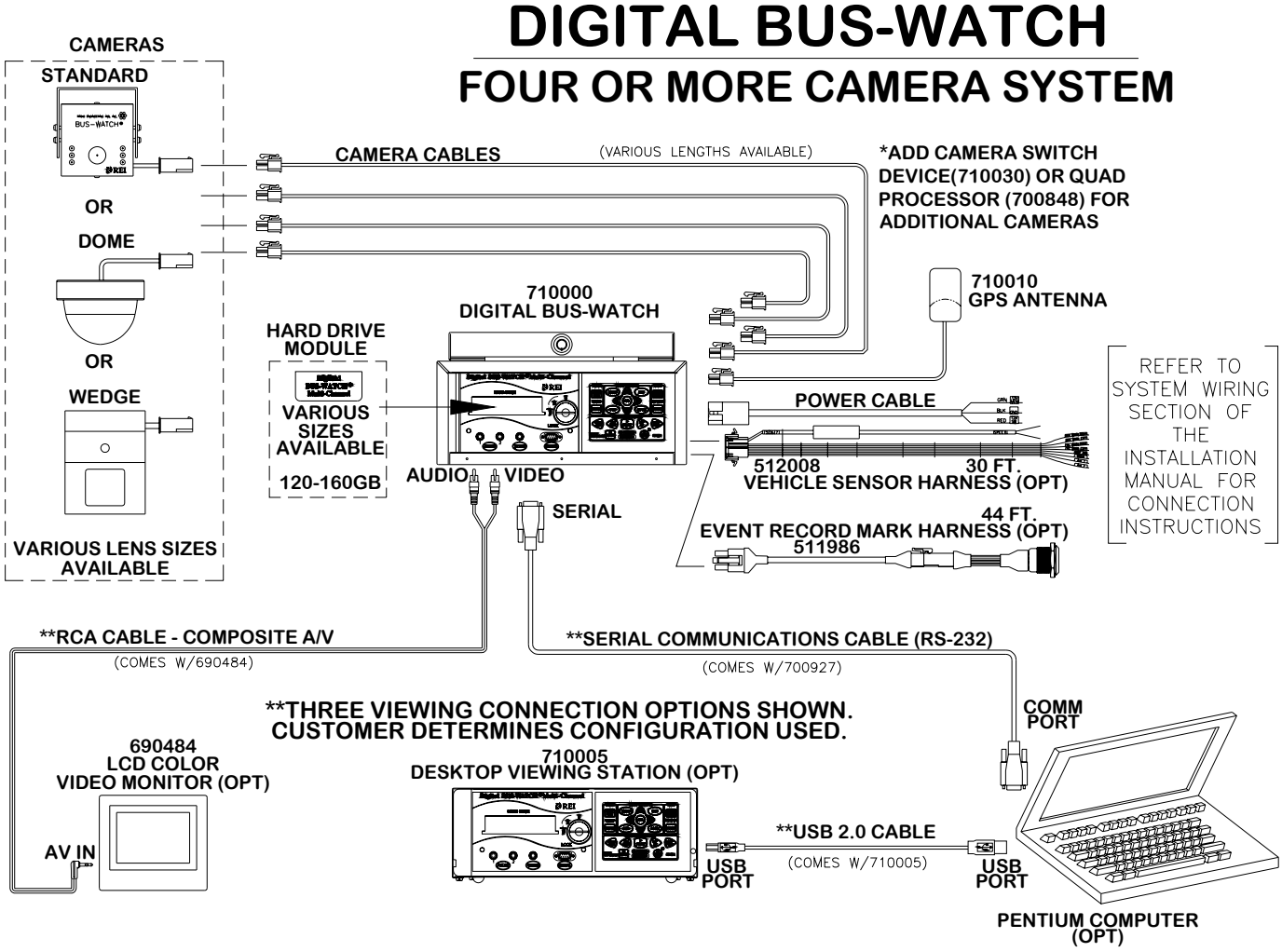


Figure 2

REI DVR Camera System Options

Table showing typical Digital BUS-WATCH® IV Systems for a variety of camera numbers

Number of Cameras	Digital BUS-WATCH® System	Frames Per Second	Concurrent Recorded Image Resolutions	Typical Camera Display Setup
4	Digital BUS-WATCH® IV	30	4 High	
5	Digital BUS-WATCH® IV + 1 Camera Switch Device	30	4 High	
6	Digital BUS-WATCH® IV + 2 Camera Switch Devices	30	4 High	
7	Digital BUS-WATCH® IV + 1 Quad Video Processor	52.5	3 High + 4 Quarter	
8	Digital BUS-WATCH® IV + 1 Quad Video Processor + 1 Camera Switch Device	52.5	3 High + 4 Quarter	
9	Digital BUS-WATCH® IV + 1 Quad Video Processor + 2 Camera Switch Devices	52.5	3 High + 4 Quarter	
10	Digital BUS-WATCH® IV + 2 Quad Video Processors	75	2 High + 8 Quarter	
11	Digital BUS-WATCH® IV + 2 Quad Video Processors + 1 Camera Switch Device	75	2 High + 8 Quarter	
12	Digital BUS-WATCH® IV + 2 Quad Video Processors + 2 Camera Switch Devices	75	2 High + 8 Quarter	
13	Digital BUS-WATCH® IV + 3 Quad Video Processors	97.5	1 High + 12 Quarter	
14	Digital BUS-WATCH® IV + 3 Quad Video Processors + 1 Camera Switch Device	97.5	1 High + 12 Quarter	
15	Digital BUS-WATCH® IV + 2 Quad Video Processors + 2 Camera Switch Devices	97.5	2 High + 8 Quarter	
16	Digital BUS-WATCH® IV + 4 Quad Video Processors	120	16 Quarter	

Figure 3

High Resolution: Full D1 (720x486)

Quarter Resolution: CIF (360x243)

DVR Features

- Search Video by Date, Hour, or External Event Triggers.
- On screen menu system for programming options.
- Hard drive heater to warm the hard drive to a safe operating temperature in cold weather.
- Non-volatile ROM and battery backed-up memory.
- Ten 24-hr. programmable timers that are used to start and stop the recording process without user (driver) intervention.
- Time and date are at the bottom of the picture so detail at the top of the picture is not hidden.
- Electrically backward compatible with previous BUS-WATCH® models.
- Front panel keypad for easy programming of options and features.
- Audio and video jacks located on the front of Digital BUS-WATCH® IV for easy access.
- Hot swappable Hard Drive Modules for easy video retrieval and less vehicle down time.

System Components

- Industrial grade Digital Video Recorder.
- Hard Drive Module (120-160GB)
- Slide mount bracket (part of 710000 or 710000FM).
- Low light CCD cameras – Color, Black & White, or Decoy (4-16)
- Camera to Digital BUS-WATCH® IV cables – 510781 (or other length cables).
- Digital BUS-WATCH® IV cabinet power cable - 512002 (or other length cable).
- Vehicle Sensor Options Harness – 512008
- Event Record / External Record Indicator Harness – 511986 (or other length cables).
- GPS Antenna - 710010
- Desktop Viewing Station - 710005

Initial Set Up

The Digital BUS-WATCH® IV system will operate without any user setup with the default settings, however, it may not show the correct time and date (Factory Set to Central Standard Time). To set the correct date and time and to program the system operation to your requirements, please refer to the ***Menu*** section of this manual.

When accessing the Menu, it is necessary to connect a video monitor to the Video jack on the front of unit. REI recommends our battery-powered 5-inch Color LCD monitor, P/N 690484.

Hard Drive Loading and Unloading

Inserting the Hard Drive: Turn the hard drive key to the unlocked and off position. Gently insert the hard drive into the bay. Turn the hard drive key to the locked and on position.

Removing the Hard Drive: Turn the hard drive key to the unlocked and on position. Gently remove the hard drive from the bay.

Note: *The Digital BUS-WATCH® IV will not function properly if the hard drive key is in the unlocked or off positions. If there is no hard drive present in the bay but the key is in the locked and on position, the Digital BUS-WATCH® IV will still power up normally, the menus can be accessed, etc.; however, the unit will not be able to record any video and the screen will read "DISK ERROR."*

System Start-Up

To start the recording process, place the *system switch* in the ON position (this will be done automatically if the *system switch* is connected to the ignition switch and the ignition switch is in the ON position). Upon turning the system switch ON, the Digital BUS-WATCH® IV will commence recording.

To stop the recording process, place the *system switch* in the OFF position. If the OFF DELAY option is enabled, the Digital BUS-WATCH® IV will continue to record for the prescribed number of minutes. When the off-delay expires, the camera and Digital BUS-WATCH® IV shut off.

Automatic Hard Drive Heater

In order to prevent the possibility of hard-drive damage during cold periods, the Digital BUS-WATCH® IV is equipped with a temperature sensor. The heater is activated when the temperature is below 40° F and the Digital BUS-WATCH® IV is turned on via system switch or timer. The red LED labeled HEATER on the front panel indicates this. The colder the temperature, the longer the heater remains on, with a maximum of ten minutes at the coldest temperatures. During this time all Digital BUS-WATCH® IV functions are inhibited and the camera remains un-powered. When the unit has completed its heating cycle, it will power up and operate normally. As the temperature inside the unit drops during operation, the heater will periodically come on to maintain a working operating temperature. The unit can operate to temperatures below -80° F. A screen is displayed on the video output jack on the front of the DVR displaying the temperature and the amount of time left on the heater cycle, see figure 4. The DVR will use this time to attempt to acquire GPS satellite signals if the GPS antenna is present in the system. A letter 'H' is present in the lower left hand corner of the screens whenever the hard drive heater is on, unless that option is unselected in the Display Options Menu.

Initial Drive Warming Screen Shot

Figure 4

Digital BUS-WATCH® IV Security Cabinet Mounting

The Digital BUS-WATCH® IV security cabinet can be mounted in any orthogonal orientation under a seat, in a parcel rack, on the floor, to a wall, etc. It should not present a trip hazard or head impact hazard, nor should it interfere with the seating, safety or comfort of the passengers. Horizontal orientation is suggested when several installation options are available. Any other orientation besides horizontal may slightly reduce the life of the hard drives, unless anti-shock and vibration measures are taken during installation.

Long Term Storage

Although the Digital BUS-WATCH® IV system draws very little current in the stand-by mode, if the system is installed but not used for an extended period of time (longer than 2 weeks) it is recommended that the power be disconnected from the DVR to avoid draining the vehicle battery. The DVR internal clock will hold time and date for up to 10 years sitting on a shelf, and the daylight savings time functions will kick in upon re-initialization when power is applied.

System Installation

WARNING

DISCONNECT VEHICLE BATTERY VOLTAGE BEFORE INSTALLING SYSTEM WIRING

WARNING

DISCONNECT POWER TO THE DIGITAL BUS-WATCH® IV BEFORE JUMP STARTING VEHICLE

System Wiring

Note: *All cables should be hidden from view.*

For the basic system (shown in Figure 5), there are five cables, one power (P/N 512002 – 16 Feet, or 512001 – 35 Feet) and 4 camera (P/N 510781 or any different length cable). For external record indication, and alarm/event marking, the Record Indicator / Event Mark Button Harness (P/N 511986) is available (shown in Figure 6). The GPS Harness (P/N 710010) is used for satellite location and movement information (shown in Figure 7). For additional vehicle monitoring, the BUS-WATCH® IV Vehicle Sensor Options harness (P/N 512008) is available (shown in Figure 8)

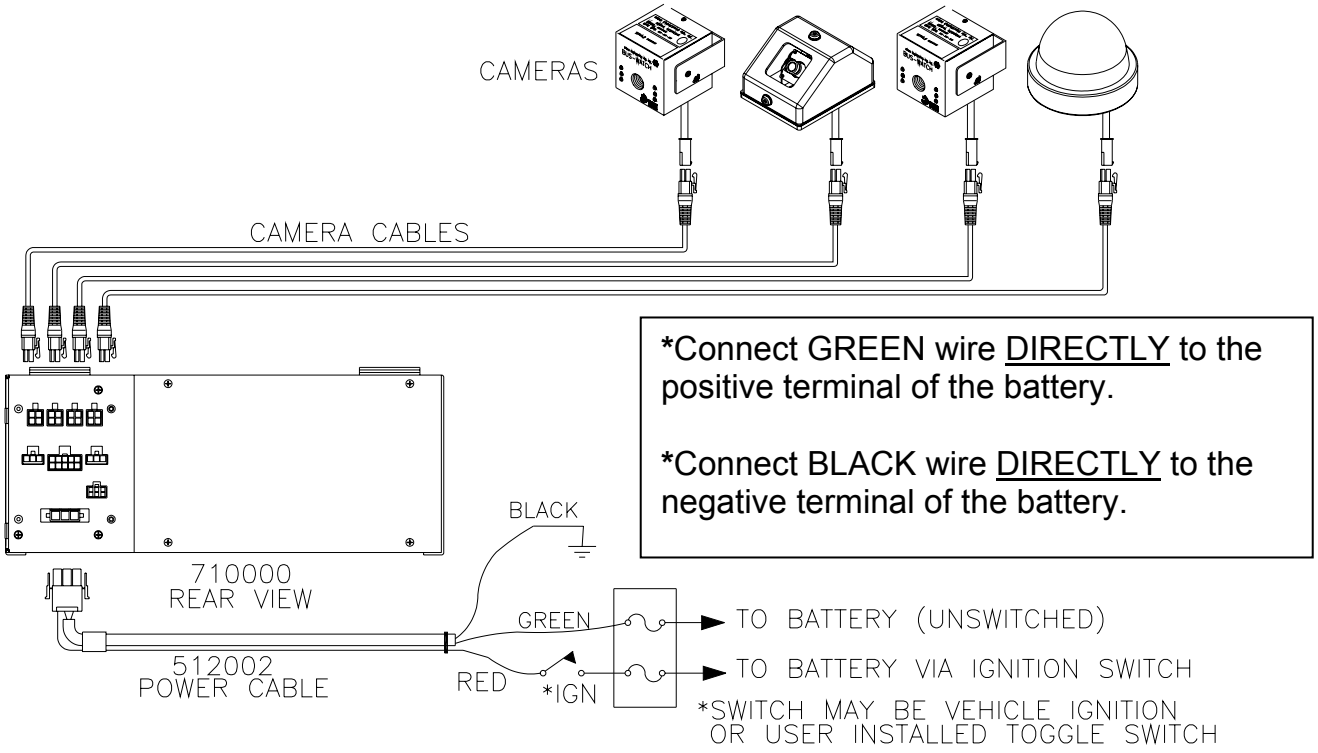
Connect the camera(s) using cable P/N 510781, or equivalent. There is no specific orientation for camera cables to be installed. If multiple types of cameras are installed in a single system, be careful to note which cameras are located where. Use lenses with more magnification (8mm) for to bring objects closer that are far away. Use lenses with less magnification (4mm) for wide angle viewing.

Connect power using cable P/N 512002, or equivalent. The black wire connects to the negative terminal of the battery. The green wire (labeled 12V Battery) connects directly to the positive terminal of the battery. **The green wire should be fused at 10 Amps if using a 7 or more camera system with a Quad Video Processor (P/Ns 700483 or 700848).** See Figure 5.

Connect any Quad Video Processors (P/Ns 700483 or 700848) or Camera Switching Devices (P/N 700462 or 710030) as needed for multiple camera systems.

IF THE SYSTEM OPERATES IN THE MANUAL RECORD MODE, connect the red wire (labeled 12V SW), to the switched side of the ignition switch. The red wire should be fused at 1 A. The red wire is ignored if the system is in TIMER record mode.

System Wiring



Note: Green wire fused @ 7A; Red wire fused @ 1 A

Figure 5

INSTALLATION NOTE:

Exposed connectors may be placed inside of connector box on security cabinet. Tampering could be further reduced by using metal conduit to route exposed wires into vehicle body. All wires should be protected from the inside and outside areas of the vehicle. Convoluted split loom should be used in all other areas to further protect the wires. All wire connections should be splice soldered and insulated or lugged.

Digital Bus-Watch® IV External Record Indicator / Event Mark Button Harness

The Digital Bus-Watch® IV External Record Indicator / Event Mark Button Harnesses come in 2 different types of switch, both in 2 different lengths. Reference the Digital Bus-Watch® IV Systems Related Part Numbers – System Harnesses section of this manual for specific part numbers. The 2 types of switches are OEM and Aftermarket. The OEM switch is rectangular and fits into a standard size dashboard knockout. The Aftermarket switch is round, for easier installation in vehicles without spare switch knockouts. All four of these cables plug into the same port on the back of the DVR. Reference Figure 6 for connection illustration.

External Record Indicator / Event Mark Button Harness Connection

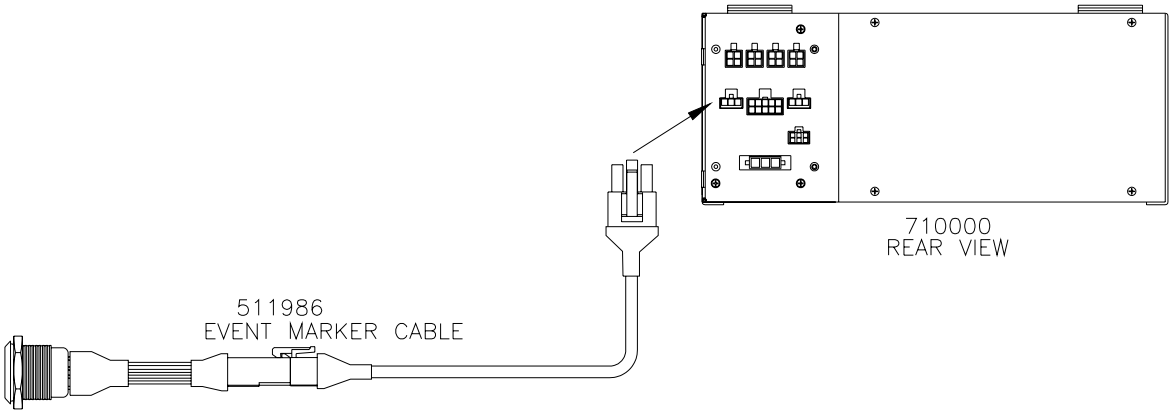


Figure 6

Digital Bus-Watch® IV GPS Antenna Module Harness

The Digital Bus-Watch® IV GPS Antenna Module Harness plugs into the back of the DVR as shown in Figure 7. Digital Bus-Watch® IV GPS Antenna Module will track up to twelve satellites at a time while providing one-second navigation updates and low power consumption. The GPS Antenna Module is housed in a black, water-resistant case and designed to withstand rugged operating conditions. Information provided to the DVR system include longitude, latitude, speed, heading, date, and time. Internal memory backup allows the GPS Antenna Module to retain critical data such as satellite orbital parameters, last position, date, and time to reduce valid data acquisition time.

GPS Antenna Harness Connection

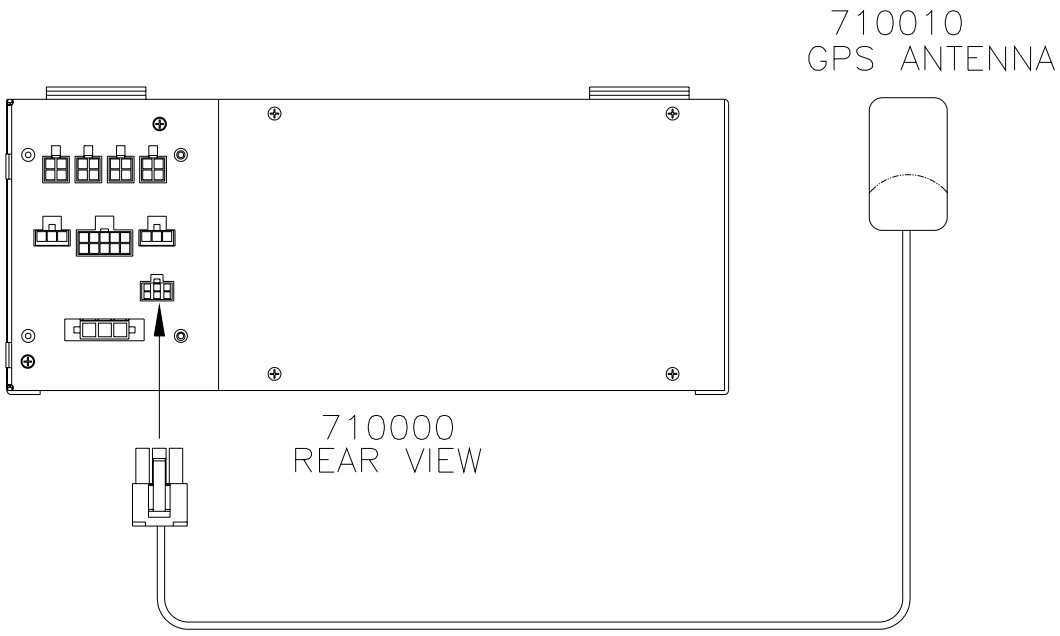


Figure 7

Digital Bus-Watch® IV Vehicle Sensor Options Harness Vehicle Connection

Vehicle Sensor Options Harness Wiring

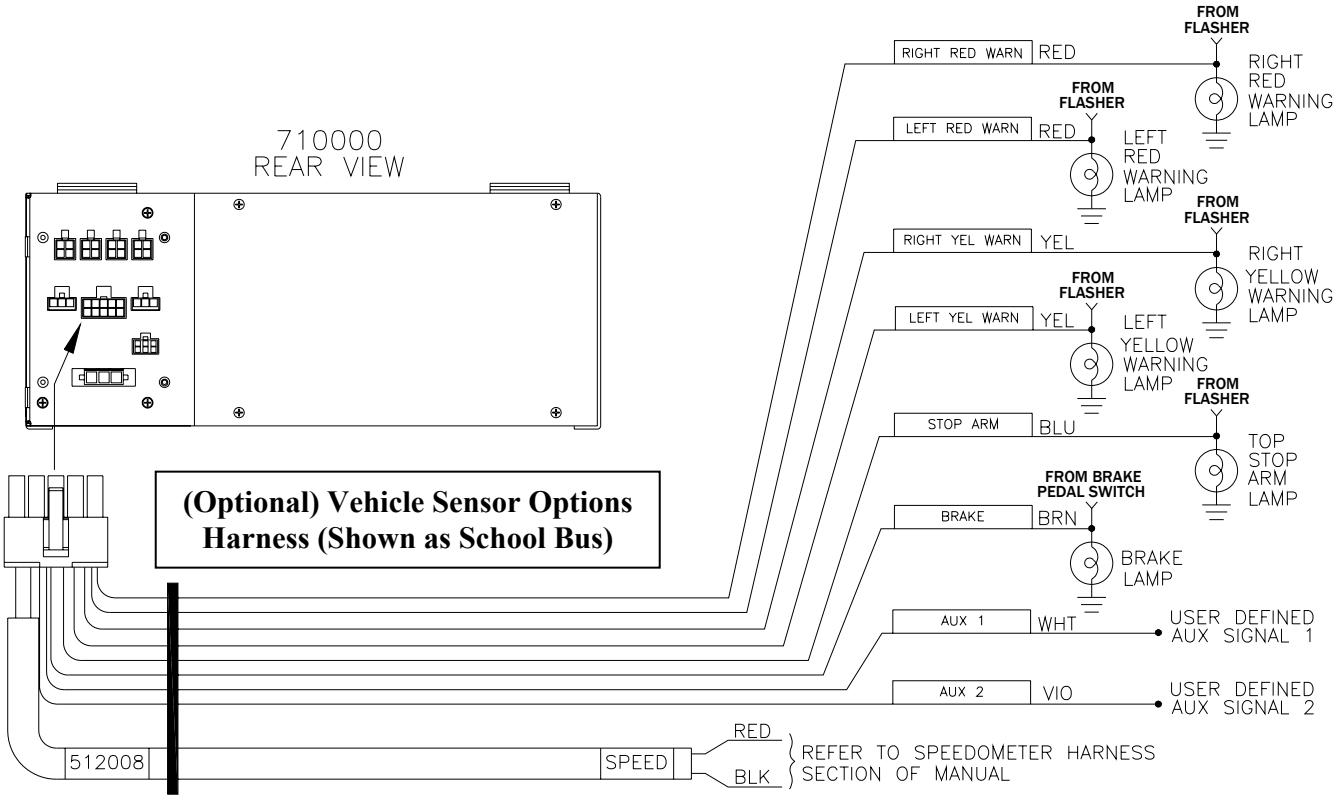


Figure 8

The BUS-WATCH® IV Vehicle Sensor Options Harness (shown in Figure 8) connects to various locations in the vehicle to provide on-screen information regarding vehicle performance. Many vehicles have different sets of signals that can be monitored. Three levels of on-screen display are available to the installer: School Bus, Transit, and Custom.

The default School Bus monitored points in the vehicle are:

- Vehicle speed
- Brake activation
- Amber warning lamp operation
- Red warning lamp operation
- Stop arm lamp operation
- Optional points with AUX 1 & AUX 2 (Aux 1 & Aux 2 are user-defined and may be used to monitor points such as turn signals, rear and front doors, etc.)

The default Transit monitored points in the vehicle are:

- Vehicle speed
- Brake activation
- Warning lamp operation (De-acceleration Lights)

- Turn signals
- Front door switch operation
- Back door switch operation
- Optional point with Auxiliary (Aux 1 is user-defined and may be used to monitor points such as wheelchair lifts, inertia sensors, etc.)

The Custom vehicle sensor option allows for most other situations. The letters that appear on the screen are settable through the menu system. The default settings are:

- Vehicle speed
- R - Red wires
- Y - Yellow wires
- L - Blue wire
- B - Brown wire
- W - White wire
- P - Purple wire

When using these options, the DEFAULT condition is that the Digital BUS-WATCH® IV considers a low voltage (or ground) the OFF state. A high voltage (5-15 VDC) is interpreted as the ON state. To switch the polarity of these signals, reference the Vehicle Sensor Levels Options menu page as described in that section of the manual.

BUS-WATCH® IV Vehicle Sensor Options Harness DVR Connection Instructions

Install the BUS-WATCH® IV Vehicle Sensor Option Harness (see Figure 8) into the security cabinet.

1. Remove the 2 mounting screws connecting the conduit box to the DVR.
2. Insert the BUS-WATCH® IV Vehicle Sensor Options Harness by plugging it into place.
3. Route the excess harness through the provided hole
4. Assemble the connector box back onto the DVR.

Speedometer Harness Wiring Instructions

Refer to the vehicle service manual for speedometer type, exact wire location, and transmission manufacturer warnings.

The BUS-WATCH® IV speedometer input wires are designed to be spliced directly onto the transmission speedometer transducer wires. In some installations, this may not be possible (i.e. mechanical speedometer, transmission manufacturer warnings, etc.). The BUS-WATCH® IV Vehicle Speed Sensor Kit (P/N 750086) may be required.

BUS-WATCH® IV Vehicle Sensor Options Harness Vehicle Connections
(Shown as School Bus)

WIRE COLOR	WIRE DESCRIPTION
(2) YELLOW	RIGHT & LEFT YELLOW WARNING LAMP BANK
(2) RED	RIGHT & LEFT RED WARNING LAMP BANK
BLUE	STOP ARM LAMP
BROWN	BRAKE PEDAL LAMP
WHITE	AUX SIGNAL 1
VIOLET	AUX SIGNAL 2

Yellow Warning Lamps
Connect the YELLOW wires to each of the Warning Lamp Flashers' Yellow lamp outputs.

Red Warning Lamps
Connect the RED wires to each of the Warning Lamp Flashers' Red lamp outputs.

Stop Arm Lamps
Connect the BLUE wire to the switched side of the top stop arm lamp.

Brake Lamp
Connect the BROWN wire to the switched side of one brake lamp.

On-Screen Information with BUS-WATCH® IV Vehicle S*ensor* Options Harness

The Digital BUS-WATCH® IV Surveillance system, when equipped with the BUS-WATCH® IV Option Harness, will display information on-screen when the vehicle's monitored switches are activated and signals are applied to the monitored sensors.

ACTIVE SWITCH OR SIGNAL	ON-SCREEN DISPLAY
BRAKE APPLIED	**B**
STOP ARM DEPLOYED	**S**
LEFT YELLOW WARNING LAMPS ON (SEE NOTE 1)	*** Y**
RIGHT YELLOW WARNING LAMPS ON (SEE NOTE 1)	**Y ***
LEFT RED WARNING LAMPS ON (SEE NOTE 1)	*** R**
RIGHT RED WARNING LAMPS ON (SEE NOTE 1)	**R ***
SPEEDOMETER (SEE NOTE 2)	**XX MPH**

NOTES:
1. The "*" symbols will alternately appear on each side of the "Y" or "R" in concert with the active lamp bank.
2. The XXs represent the vehicle speed (i.e. 35).

Physical Mounting Requirements

There are two common ways to mount the Digital BUS-WATCH® IV. First is the under-seat, or hanging, method. This method mounts the slide bracket to the underside of a seat. Second is the floor-mount method. This method mounts the Digital BUS-WATCH® IV to the floor of the bus. Figure 9 shows the minimum area for the system installation.

DVR Physical Mounting

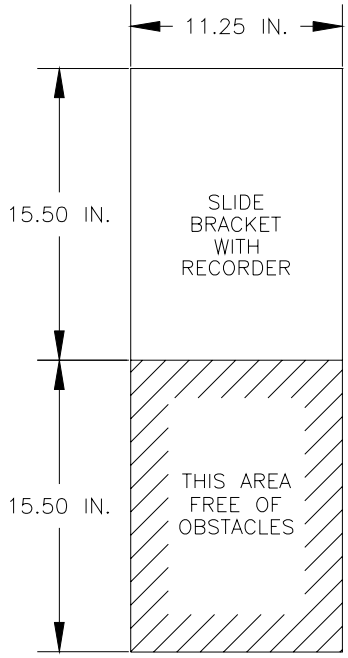


Figure 9

Digital BUS-WATCH® IV Hanging Mount
(See Figure 10)

1. Find a suitable location under the first seat behind the driver or under the driver's seat.
2. An area 15-1/2 inches should be unobstructed in front of the slide bracket to allow sliding the security cabinet onto the slide bracket.
3. If necessary modify the positions of the tower, connector box, and slide rails according to the instructions above.
4. Position the slide bracket on the frame of the seat in the desired location. Drill 5/16th inch holes through the frame using the bracket as a guide.
5. Attach slide bracket to seat frame using nuts and bolts.

Note:

Use clamps to attach slide bracket to the under-seat location if necessary. Ensure stable mounting for proper DVR operation. DVR must be solid to vehicle frame.

Under Seat Mounting

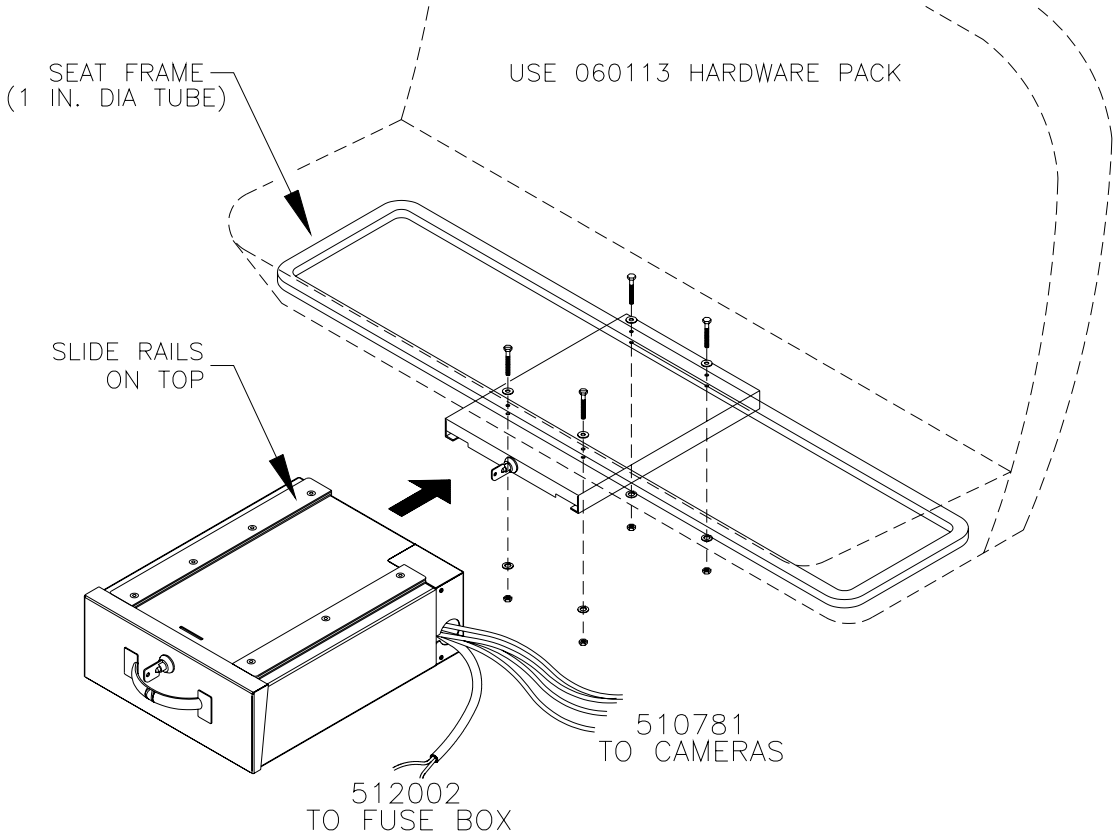


Figure 10

Mount Conversion

Digital BUS-WATCH® IV Cabinet Modification

(See Figure 11)

Reverse the placement of the slide rails with screws and washers from top to bottom of the Digital BUS-WATCH® IV.

DVR Cabinet Modification

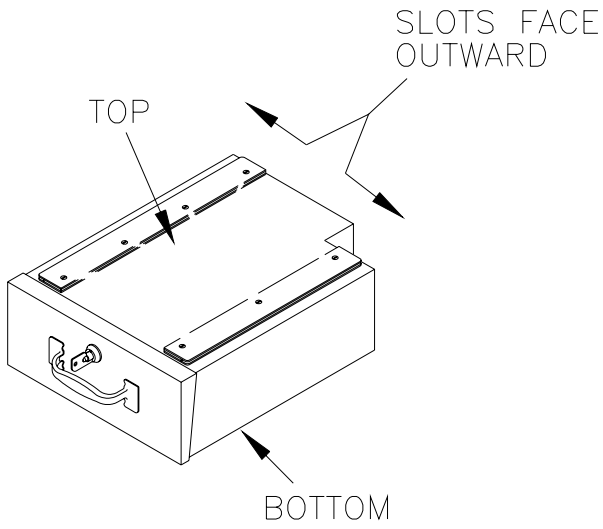


Figure 11

Digital BUS-WATCH® IV Floor Mount Installation

Find a suitable location to mount the slide bracket on the floor. The Digital BUS-WATCH® IV should not present a trip hazard or head impact hazard and should not interfere with the seating, safety, or comfort of the passengers.

1. An area 15 and 1/2 inches should be unobstructed in front of the slide bracket to allow sliding the Digital BUS-WATCH® IV onto the bracket.
2. Position the slide bracket on the floor and drill four 3/16th inch holes into the floor using the mounting holes as a guide.
3. Set aside the slide bracket. Position four rubber shock mounts over the pilot holes.
4. Place the slide bracket over the rubber shock mounts. Align the mounting holes to the center of the shock mounts.
5. Secure slide bracket to the floor using four lag bolts.
6. Carefully slide the cabinet onto the slide bracket being sure to check alignment of the connector. Lock to secure.

DVR Floor Mounting

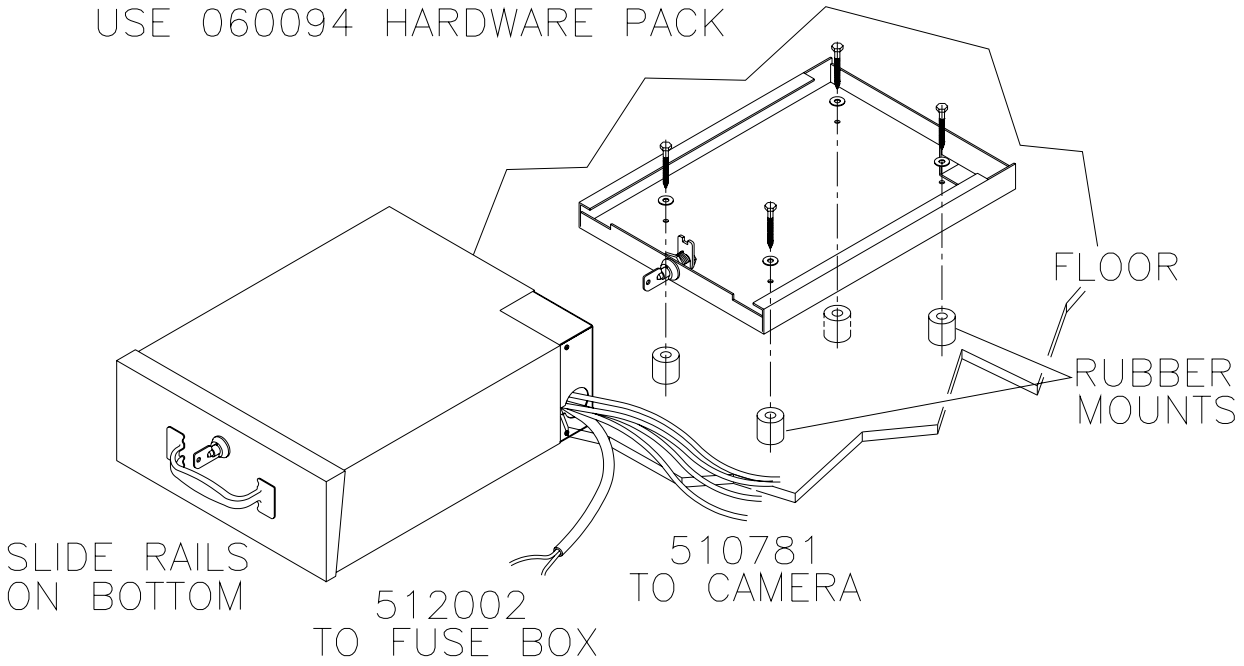


Figure 12

Camera Placement

The Digital BUS-WATCH® IV cameras can be mounted anywhere in the vehicle, unless this does not give a stable mount or it vibrates excessively. Outdoor cameras should be used for exterior placement.

Camera Connection and Placement

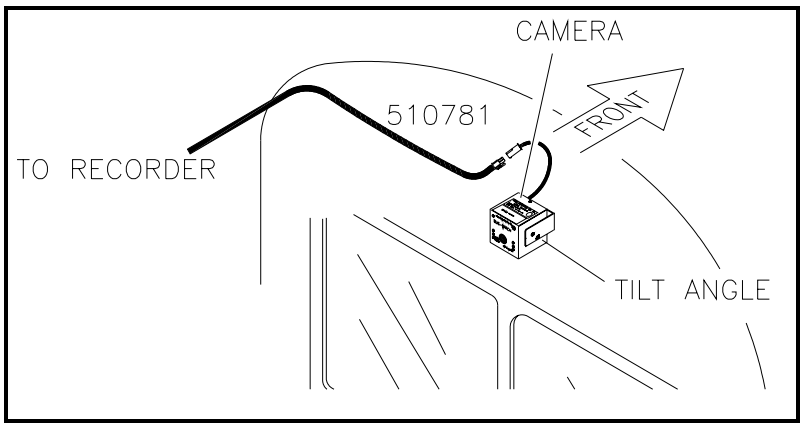


Figure 13

Potential Multiple Camera Placement Options

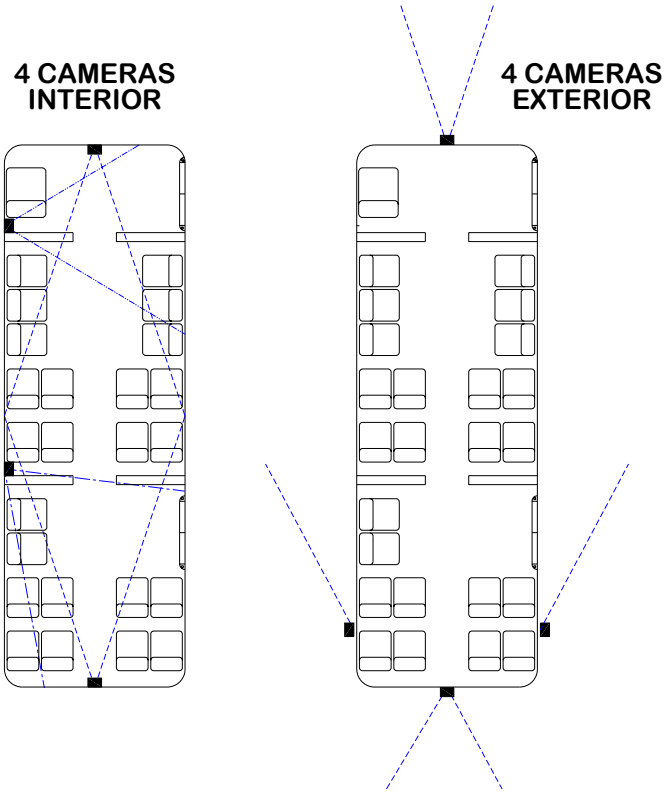


Figure 14

Digital BUS-WATCH® IV Basic Operation

The Digital BUS-WATCH® IV functions somewhat like a VCR, except that the recorded video is stored on the hard drive, rather than on a video tape. To view the recorded video or to access the MENU functions, connect a monitor to the Digital BUS-WATCH® IV using the front jacks labeled AUDIO and VIDEO. The end user supplies the monitor and the cable to connect the monitor. The Digital BUS-WATCH® IV has several modes of operation.

SLEEP mode: In a mobile, battery-powered application, it is critical to minimize power consumption to prevent draining the vehicle battery, therefore, whenever the unit is not recording, it automatically enters SLEEP mode. In SLEEP mode, the unit's power consumption is minimal. The red LED on the Power Switch on the front panel is off when the unit is in SLEEP mode. Menu access is available in this mode.

RECORD mode: While the unit is actively recording video, it is in RECORD mode. The red LED on the Power Switch is on, and the green LED near the REC button is on. The unit can be placed in RECORD mode in one of three ways: system switch, programmable timer, and pressing the REC button.

PLAYBACK mode: While the unit is playing back recorded video, it is in PLAYBACK mode. The red LED on the Power Switch is on. When the unit is PLAYBACK, the on-screen display will read PLAY and either "(-" or "-)". This indicates the direction the video is playing, forward or backward. The direction can be switched by the FF or REW buttons.

MENU mode: The MENU mode can be activated any time the Power Switch is turned on by pressing the MENU button. In the MENU mode, the unit's settings and options can be accessed. The MENU mode operations are described below. The DVR does not record when in the MENU mode.

MONITOR mode: When the Digital BUS-WATCH® IV is active, but not in RECORD, MENU, or PLAYBACK mode, it is in MONITOR mode. The live video from the VIDEO input is displayed on the monitor.

Hard Disk Drive Modules

Digital BUS-WATCH® IV Hard Drive Modules only work with Digital BUS-WATCH® IV Systems. Audio & Video recorded on a REI Digital BUS-WATCH® IV DVR can only be played back on a REI Digital BUS-WATCH® IV DVR or Viewing Station. Version **IV** DVRs record Event Information on the Hard Drives as well as 4 channels of Audio & Video. When swapping hard drives between older versions of the Digital BUS-WATCH® Systems, the video will pause on playback and basically keep going until the DVR or Viewing Station can recognize the video. If 30 minutes of video is recorded onto

the drive with another system, the unit will pause for 30 minutes of normal play until valid video can be presented. Fast forwarding through the 30 minutes of video will reduce the amount of pause time. It is not recommended to swap drive between old and new systems, as the results during playback will not be as intended. The drives are easily identifiable as to which DVRs they belong to by the color of the face of the Hard Drive and the DVR or the Viewing Station. Black was used for earlier versions of the DVRs; Blue is used for this system.

REI Splash Page

REI Digital BUS-WATCH® IV Hard Drives act much as VCR tapes for recording of Video and Audio, but with much more storage space. One other primary difference is 'Instant Rewind Time'. Because of the ability of the DVR during playback to play from the 'End' of the drive to the 'Beginning' of the drive without pause, leaving the user to not be sure if they had viewed all of the video on the drive or not, it became necessary to mark the physical beginning and ending of the drive. This is shown as the REI Splash Page. Reference Figure 15.

REI Hard Drive Splash Page

Figure 15

The Splash Page shown above is displayed whenever the DVR is playing through the physical address 0 of the drive. The Splash Page is not set at the mark between the oldest and newest video, know as the Current Drive Record Marker. When viewing the video, the Splash Page will appear at some point in the video. Pressing

PLAY, FF, or REW on the face of the DVR or Viewing Station will take the playback through to the next or previous frame. No frames are dropped because of appearance of this page. In the event that the Splash page appears in the middle of the event that is being viewed, the Splash Page can be taken out of the video event during the process of transferring the video to a computer file. Call REI Technical Support for special instructions on this topic at 1-877-726-4617.

Front Panel

The user controls the functions of the Digital BUS-WATCH® IV with the buttons on the front panel. (See Figure 16)

Front Panel Keypad

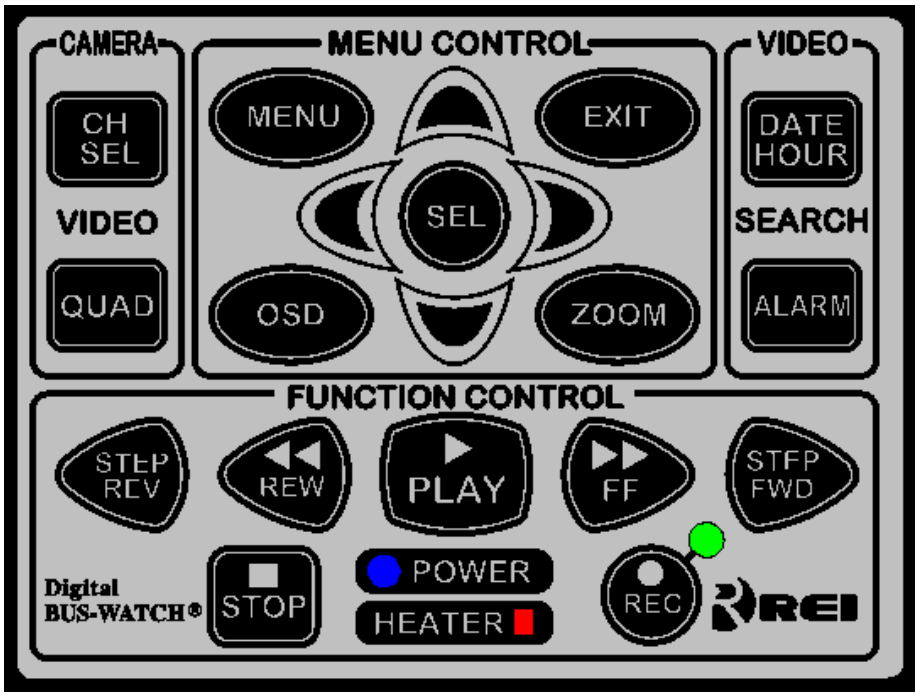


Figure 16

Controls:

- **MENU CONTROLS**
  - **MENU** - Brings up the System Control menu.
  - **EXIT -** Exits the current menu or function.
  - **SEL** - Selects the current menu setting. Functions much like an ENTER key. If the unit is in SLEEP mode, pressing this button causes it to wake up and enter RECORD mode. If the SYSTEM SWITCH is off, pressing this button again puts the unit back into SLEEP mode.
  - **Directional Arrows** - These buttons are used to navigate the menus.

  - **OSD –** This button brings up and removes the overlaid status On Screen Display. The overlaid status On Screen Display is not permanently recorded to the hard drive, as opposed to the time and date display which is recorded to the drive.
  - **ZOOM –** Toggles on and off the zoom mode functionality.
- **FUNCTION CONTROLS**
  - **PLAY** - Plays back recorded video. Begins playback at the last recorded image.
  - **REC** - Starts recording. Recording is indicated a green LED near this button.
  - **STOP** - If the unit is recording, this button stops the recording. If the unit is playing, this button acts as a PAUSE. Pressing this button while PAUSED stops playback and puts the unit in Monitor Mode.
  - **FF** - If the unit is playing, this button FAST FORWARD SCANS through the recorded video. Pressing this button several times increases the scanning speed.
  - **REW** - If the unit is playing, this button REWIND SCANS through the recorded video. Pressing this button several times increases the scanning speed.
  - **STEP REV** - If the unit is in play mode and paused, this button moves the video back one image.
  - **STEP FWD** - If the unit is in play mode and paused, this button moves the video forward one image.
- **CAMERA CONTROLS**
  - **CH SEL** - This button selects through the available individual camera views.
  - **QUAD** – This button changes the video output display back to the 4 channel quad display.
- **VIDEO CONTROLS**
  - **DATE HOUR** – If the unit is in play mode and paused, this selects between date search and hour search modes.
  - **ALARM** – If the unit is in play mode and paused, this selects the alarm search mode.

Menu System

The menu system allows the user to set and save the system operating parameters.

Connect a monitor to the Digital BUS-WATCH® IV using the front jacks labeled AUDIO and VIDEO. To activate the menu system, press the MENU button. The first screen that appears is the Main Menu.

Main Menu Screen

The Main Menu Screen has several different options used to configure the system's operating parameters. Use the arrow keys to move the cursor to the desired line and press SEL to execute the desired command. See Figure 17.

Main Menu Screen Shot

Figure 17

FACTORY DEFAULT
Changes the DVR setting back to the original factory settings.

SYSTEM INFORMATION
Shows the temperature and voltage extremes, record time, and other DVR information.

TIME/DATE MENU
Used to set the time, date, and Daylight Saving time settings.

AUDIO CONTROL MENUS
Allows the user to set the output volume and input audio paths.

SET VEHICLE ID
Used to program this specific unit's Vehicle ID # or description.

CALIBRATION
Allows the user to calibrate the speedometer and voltmeter functions.

CAPTURE IMAGE
Used when downloading digital images to a PC via the serial port.

DISPLAY OPTIONS

Allows the user to determine what information is recorded onto the screen.

PLAYBACK SEARCH OPTIONS

This screen directs users to specific portions of the video for fast retrieval.

RECORDING OPTIONS

Allows the user to change frame rates and compression levels.

Factory Default

If this item is selected, the system's internal settings will be set to the factory defaults. This includes:

- Total Record Time reset to zero.
- Minimum and maximum temperature and voltage data erased and reset to current conditions.
- Record Mode set to Manual
- Daylight Saving Time enabled.
- 24-hour Mode disabled.
- Off Delay set to 0 minutes.
- Screen width and position settings reset to defaults.
- Speedometer calibration reset to default (01AC).
- Vehicle ID reset to "REI004" (Figure 25 on Page 32).
- All Timers set to defaults as shown in Figure 51 on Page 52.
- Vehicle Sensor Options set to Transit Settings (Figure 40 on Page 43).
- Alarm Recording Options all turned Off as shown in Figure 48 on Page 48.
- On Screen Display Options set as shown in Figure 36 on Page 40.
- Playback Volume set to maximum output level (10).

Warning: *Do not select this function unless you want* ***ALL*** *settings changed back to their factory defaults!*

System Information Screen

This screen is used to show information that might be useful during troubleshooting.

- SOFTWARE VERSION: The current version of control software.
- SERIAL NUMBER: The hardware serial number associated with the DVR.
- SPEEDO FACTOR: A number used by the microprocessor control software to calibrate the internal speedometer that uses the transmission pulse outputs.
- RECORD HOURS: Total number of hours the Digital BUS-WATCH® IV unit has recorded video footage.
- SYSTEM VOLTAGES: Minimum and maximum readings of the bus system voltage.
- ENCLOSURE TEMPERATURES: Minimum and maximum readings of the temperature within the Digital BUS-WATCH® IV cabinet.

Reference: Figure 18.

System Information Page Screen Shot

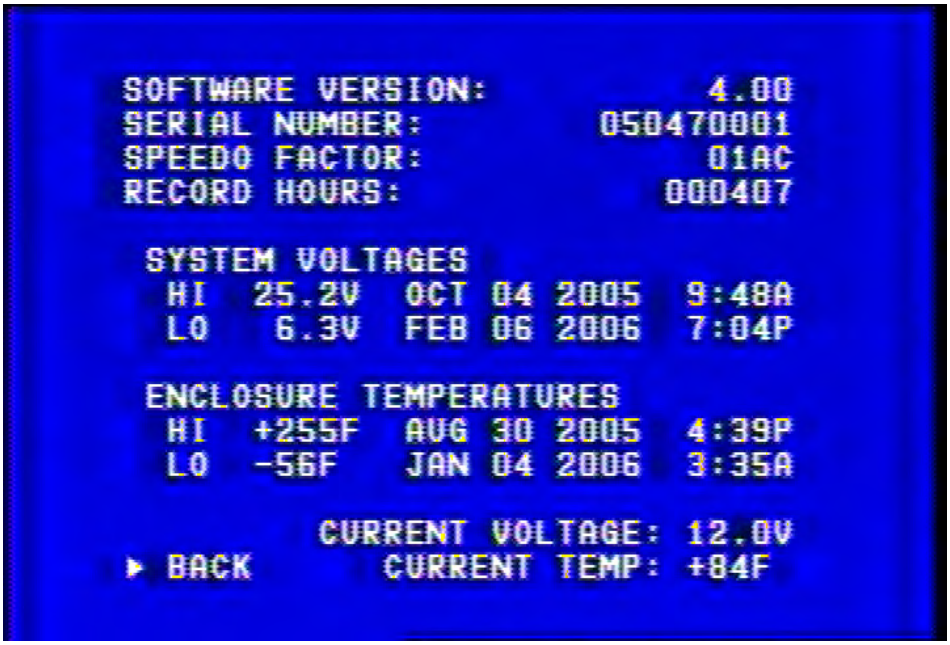


Figure 18

Set Time/Date Screen

Use the arrow buttons to step through the month, day, and year. The weekday is set automatically. Repeat this with the hours, minutes, and seconds. AM/PM is set automatically. Reference: Figure 19.

Time/Date Menu Screen Shot

Figure 19

Daylight Saving Time

When set to **Y**es, the system clock will change automatically with Daylight Saving Time. If your region does not use Daylight Saving Time, setting this item to **N**o disables the Daylight Saving Time function.

24-Hour Mode

When set to **Y**es, the clock will be displayed in a 24-hr format. If set to **N**o, the clock will be displayed in a 12-hr. format.

DST Trigger Menu

On August 8, 2005, President George W. Bush signed the *Energy Policy Act of 2005*. This Act changed the time change dates for Daylight Saving Time in the U.S. Beginning in 2007, DST will begin on the second Sunday of March and end the first Sunday of November. The Secretary of Energy will report the impact of this change to Congress. Congress retains the right to revert the Daylight Saving Time back to the 2005 time schedule once the Department of Energy study is complete. Because of this, certain real-time clock embedded systems need to have the ability to automatically change in 2007 to the new times, but also be able to be changed back in case they change their minds. Figure 20 shows the default Daylight Saving Time settings in 2006. The DST Mode can be set from 'AUTO' to 'CUSTOM'. When the DST Mode is set to 'AUTO', the Daylight Saving Time triggers will change to the new rules in 2007 as shown in Figure 21. When the DST Mode is set to 'CUSTOM', the Daylight Saving Time triggers can be changed to any of the first, second, third, fourth, or last week of any month, not overlapping.

2006 DST Trigger Screen Shot

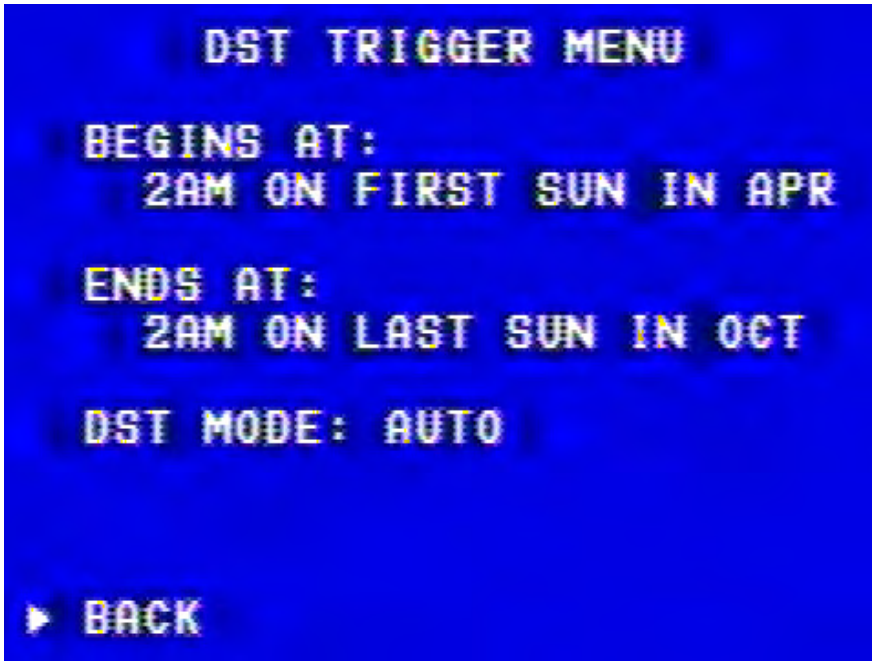


Figure 20

2007 DST Trigger Screen Shot

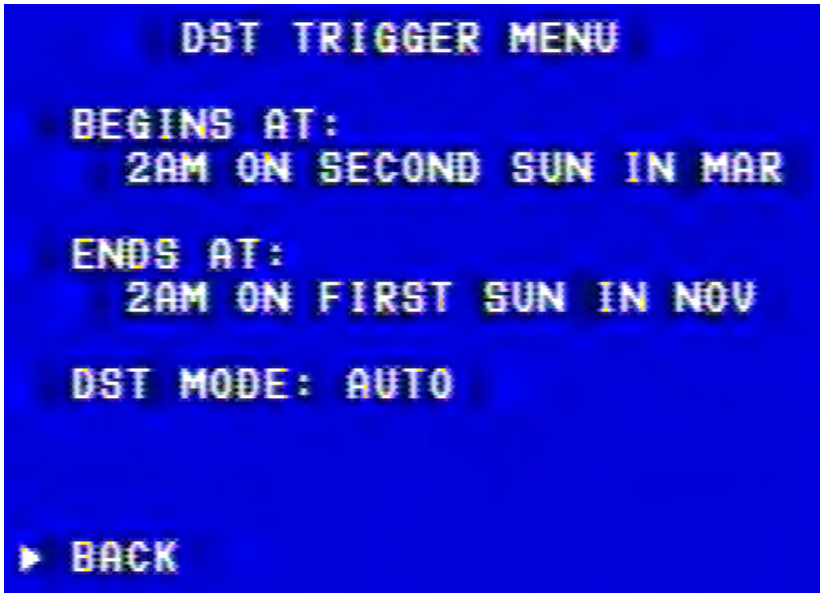


Figure 21

Audio Control Menus

The REI Digital BUS-WATCH® IV has 2 audio channels labels as 1 & 2, or white and red, respectively. The Channel Selection Menu allows users to configure which cameras are recorded on which channels, and the Playback Volume Menu allows the user to change the volume level of either output channel.

Audio Control Menus Screen Shot

Figure 22

Audio Channel Selection Menu

Use the up and down arrow buttons and the SEL button to change the camera audio 'ON' or 'OFF' for each channel. All cameras can only be selected to 'ON' on only one channel at a time. Cameras can be selected to 'OFF' on both channels simultaneously.

Audio Channel Selection Menu Screen Shot

Figure 23

Playback Volume Menu

Use the up and down arrow buttons and the SEL button to change the volume output levels. The REI Digital BUS-WATCH® IV always records audio at the maximum record level on both channels. Use this setting for control of the Playback Output Levels.

Playback Volume Menu Screen Shot

Figure 24

Set Vehicle ID Screen

This screen is used to set the Vehicle ID that will be shown on the on-screen display during normal operation. The Vehicle ID can be up to sixteen characters long.
Reference: Figure 25.

Set Vehicle Identification Page Screen Shot

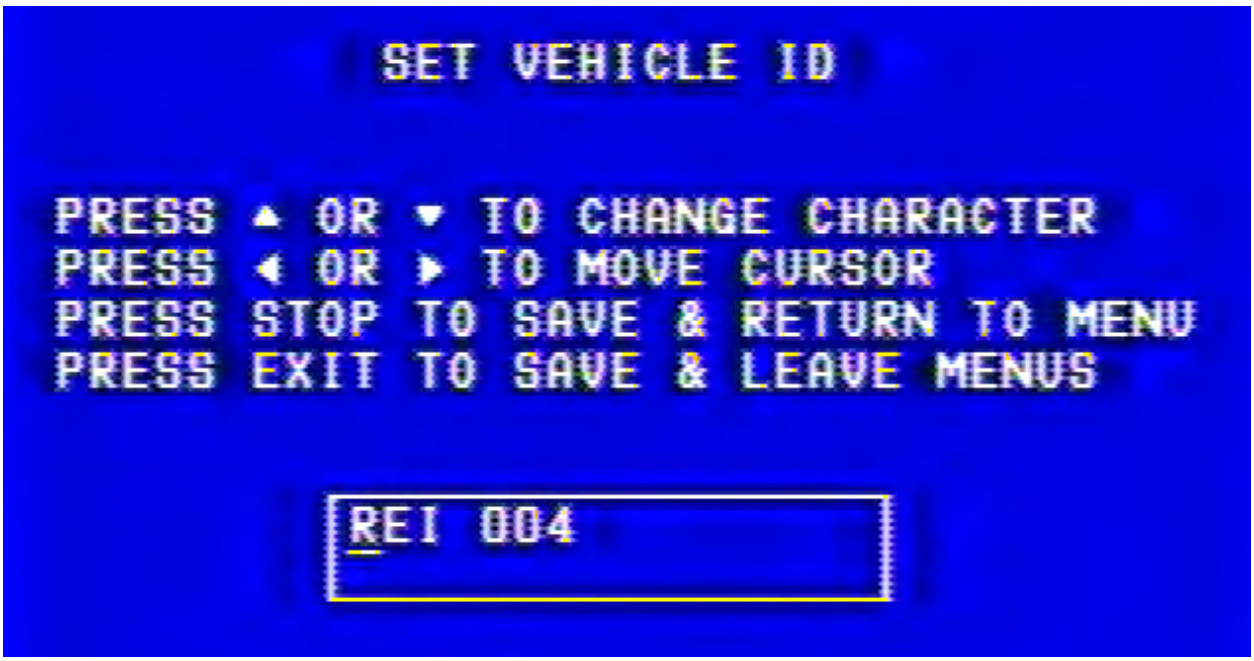

SET VEHICLE ID
PRESS ▲ OR ▼ TO CHANGE CHARACTER
PRESS ◀ OR ▶ TO MOVE CURSOR
PRESS STOP TO SAVE & RETURN TO MENU
PRESS EXIT TO SAVE & LEAVE MENUS
REI 004

Figure 25

Use the UP and DOWN arrow buttons to change the flashing character to the desired setting. Each character is changed individually. Press RIGHT or SEL to move to the next character.

Calibration Screen

This submenu screen has three different options, Speedometer Calibration, and Speedometer Signal Levels, and Screen Adjustment.
Note: *These speedometer functions are used when connecting the speedometer input to the transmission output pulses. The On Screen Display of the vehicle speed automatically reverts to the GPS output when valid GPS data is present. When valid GPS data is not present, as in long tunnels or around many very tall buildings, the transmission pulse data will display if connected and calibrated properly.*

Calibration Menu Screen Shot

Figure 26

Speedometer Calibration Screen

Because speedometers can vary greatly among bus manufacturers, the Digital BUS-WATCH® IV has the ability to calibrate its own speedometer to that of the bus. Follow this procedure to calibrate the speedometer:

- Drive the bus at a known and constant speed, such as 30 mph.
- Bring up the Speedometer Calibration Screen. The screen will display what the Digital BUS-WATCH® IV system perceives as the vehicle's speed.
- Use the UP and DOWN arrow keys to adjust the displayed speed to match that the vehicle's speedometer. This might require many key presses.
- Try using the down arrow button first, as this will give a more responsive display.
- When the speeds match, press EXIT to save the calibration and return to the previous menu. The displayed speed will now match that of the vehicle.

Speedometer Calibration Page Screen Shot

Figure 27

Speedometer Signal Levels Screen

Considering the wide variety of speedometer pulse signal levels from the various types of transmissions, the Digital Bus-Watch® IV System allows users to manually set the speedometer input filter circuitry to best match the vehicle output signal.

Speedometer Signal Levels Screen Shot

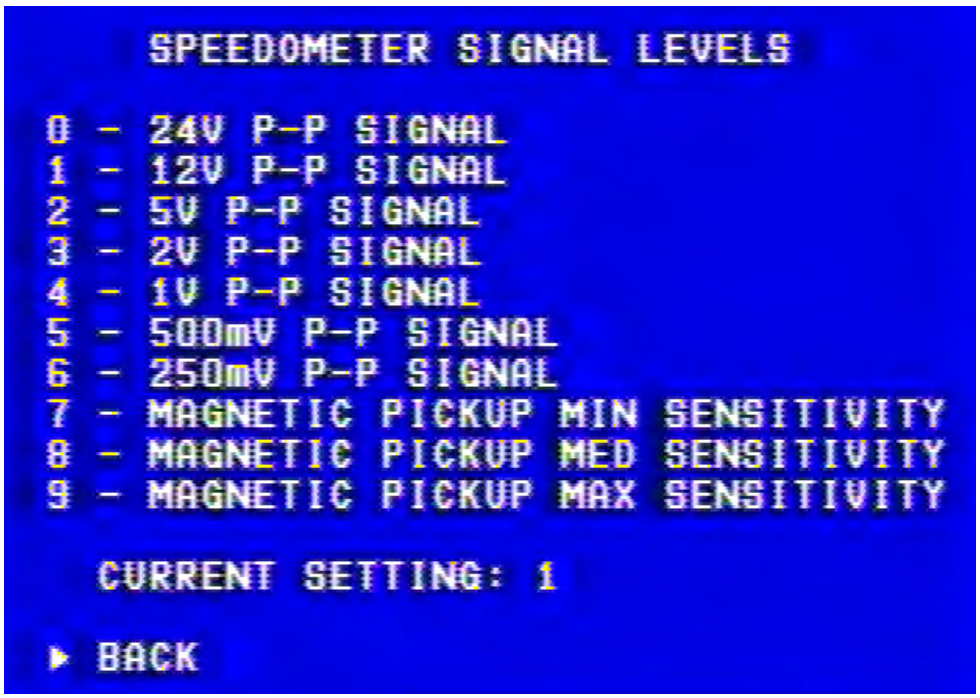

SPEEDOMETER SIGNAL LEVELS
0 - 24V P-P SIGNAL
1 - 12V P-P SIGNAL
2 - 5V P-P SIGNAL
3 - 2V P-P SIGNAL
4 - 1V P-P SIGNAL
5 - 500mV P-P SIGNAL
6 - 250mV P-P SIGNAL
7 - MAGNETIC PICKUP MIN SENSITIVITY
8 - MAGNETIC PICKUP MED SENSITIVITY
9 - MAGNETIC PICKUP MAX SENSITIVITY
CURRENT SETTING: 1
BACK

Figure 28

Screen Adjustment Screen

This screen is used to adjust the position and width of the on-screen display, using the arrows and the SEL buttons.

There is an 'X' in each corner of this screen to make it easy for the user to center the display in the monitor. Reference Figure 29.

Screen Adjustment Page Screen Shot

Figure 29

Center On-Screen Display

Use the arrow buttons to center the four 'X's in the screen. Pressing MENU resets this setting to the factory defaults. When finished, press EXIT to save the settings.

Center OSD Page Screen Shot

Figure 30

Adjust Width

Use the left and right arrow buttons to change the width of the on-screen display. Pressing MENU resets this setting to the factory defaults. When finished, press EXIT to save the settings.

Adjust Screen Width Page Screen Shot

SCREEN ADJUSTMENT
CENTER ON-SCREEN DISPLAY
ADJUST WIDTH
USE LEFT AND RIGHT ARROWS TO
ADJUST SCREEN WIDTH
W:70
PRESS MENU TO RESET DEFAULT
PRESS STOP TO SAVE & RETURN TO MENU
PRESS EXIT TO SAVE & LEAVE MENUS

Figure 31

Capture Image Screen

This submenu screen is used when you wish to download a still image to a PC via the serial port. See Figure 32. ***Note:*** *With all MENU functions, you must have a video monitor connected to the VIDEO OUT jack on the Digital BUS-WATCH® IV. Live video images cannot be transferred directly to PC through the serial cable. That function is accomplished through the Digital BUS-WATCH® IV Viewing Station (710005) via USB.*

Capture Image Page Screen Shot

Figure 32

The procedure to download an image from the Digital BUS-WATCH® IV is as follows.

- Connect the serial cable from the PC to the jack on the front of the Digital BUS-WATCH® IV.
- On the PC, open and run the REI Viewer software. (The software must be installed in advance.) The PC is now waiting to download an image.
- Press MENU to bring up the Main Menu.
- Select CAPTURE IMAGE.
- Select DOWNLOAD IMAGE NOW. The video switches from the MENU to the current PLAYBACK image. Control of the PLAYBACK is now shared between the unit's front panel and your PC.
- On the PC, left-click the tools button. This brings up a communication configuration menu. See Figure 33.

PC Viewer Screen Shot

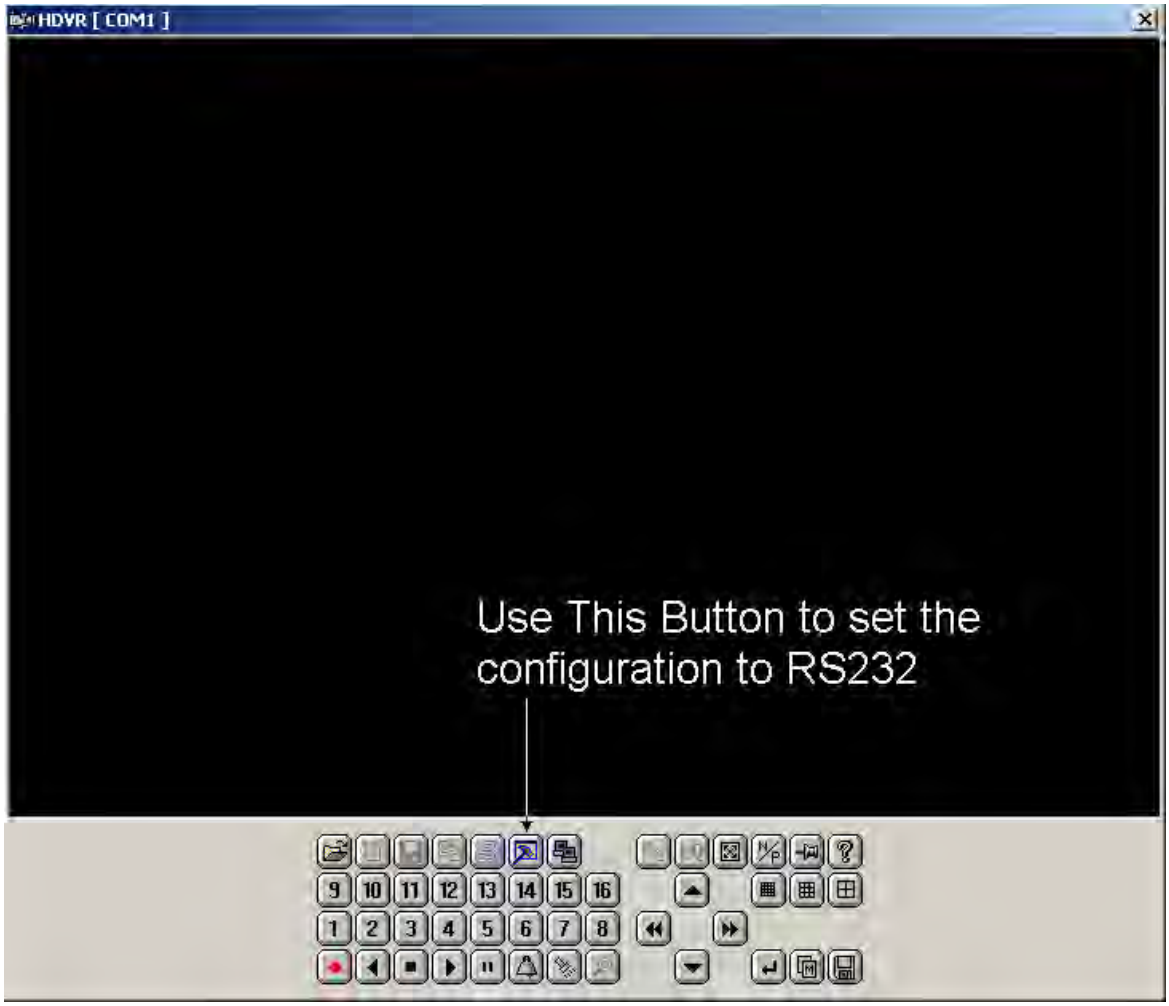


Figure 33

- Set up the communication configuration as shown in Figure 34:

PC Configuration Screen Shot

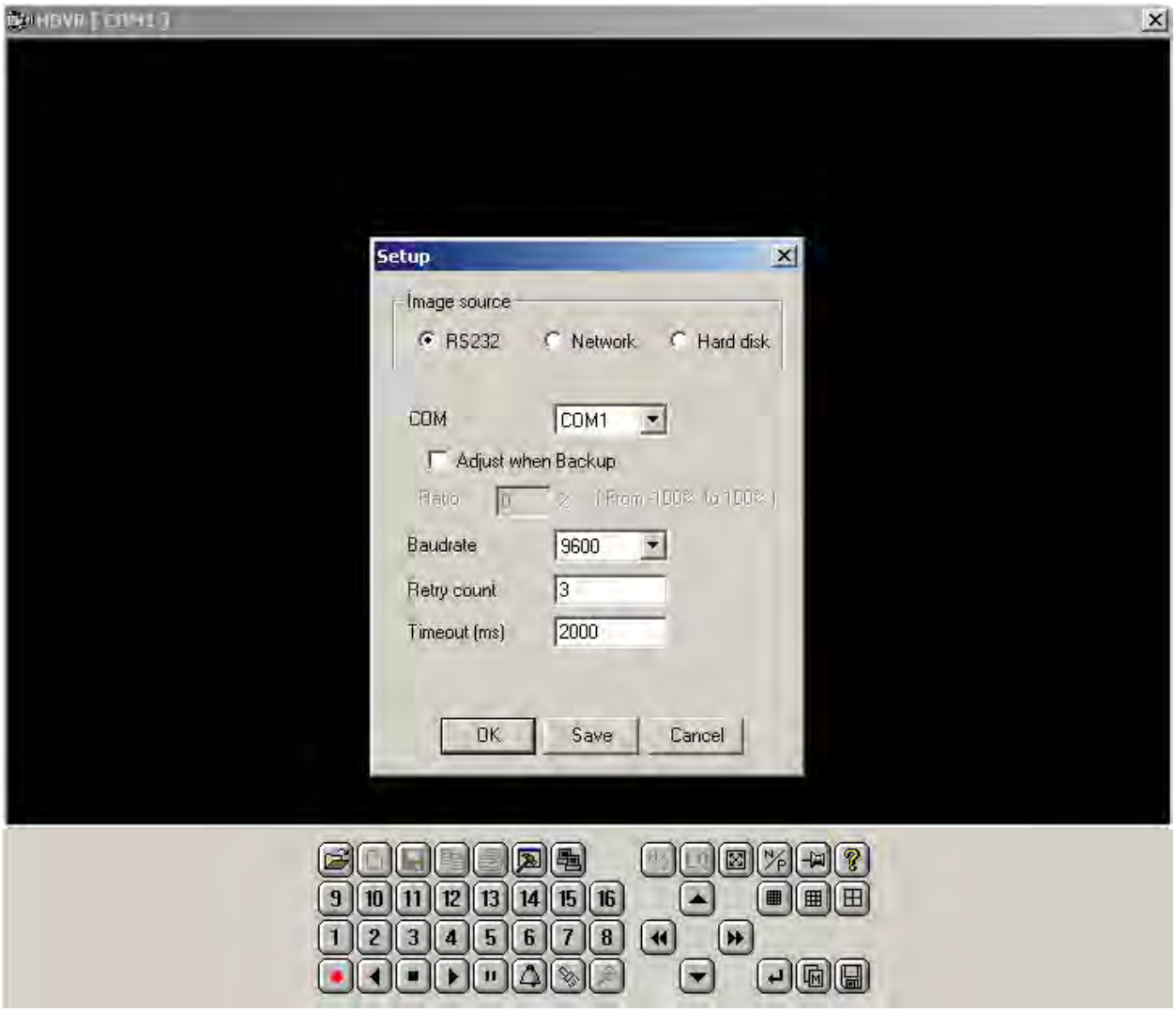


Figure 34

- When you have the image displayed on video monitor that you want to download, pause that image, and close the virtual control panel by clicking on the X button.
- Select the channel you want to download, and click on the Link to DVR button.
- To save the image as a PC file, select the Save file button.
- If you want to download more images, you can either use the control panel on the Digital BUS-WATCH® IV or use the other buttons on the virtual control panel. Before you can move to the next image, however, you must PAUSE the video. When you do this, the CATURE indicator on the video screen should disappear. You can then move the video image to the next image you want to download. Repeat the two previous steps.

- When you are finished downloading images, press the EXIT button on the front panel of the Digital BUS-WATCH® IV. This switches the unit back into the MENU mode, and transfers control from the PC back to unit's control panel.
- Press EXIT to return to the previous menu.

The REI Viewer software. Can also be used as a remote control to the viewing station. Figure 35 shows the functionality of the buttons used for this application:

Remote Control Buttons Screen Shot

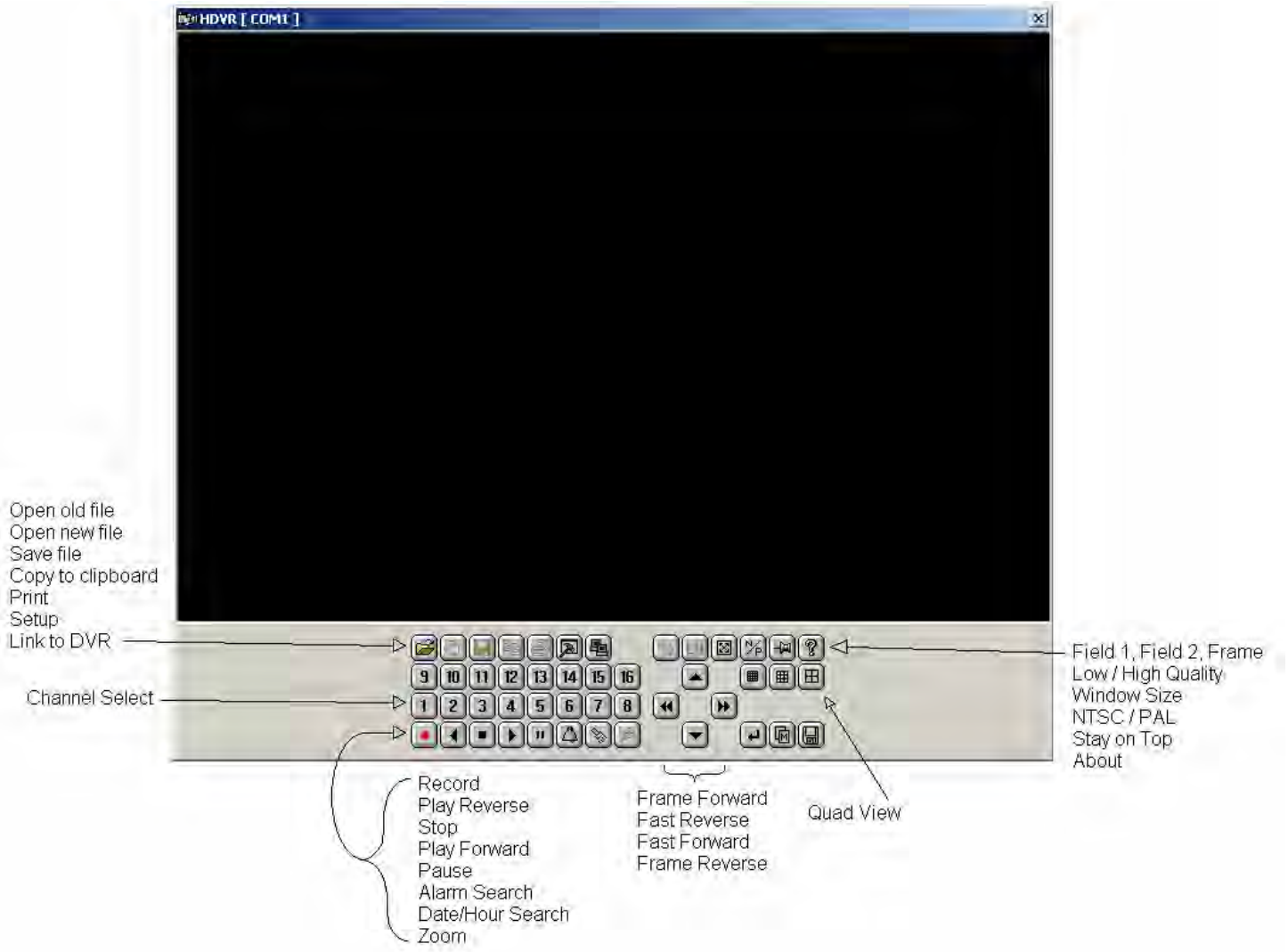


Figure 35

On Screen Display Options

This item takes you to another screen that allows you to customize what is shown on this unit's on-screen display. The Main Display Options determines which information is displayed on the screen. The information display from this menu will automatically move the information to lower parts of each screen depending on which information is chosen to be displayed. The GPS Display Options are all on by default, but only are displayed if the DVR detects a GPS receiver (71001) connected to the unit. The Vehicle Sensor Options allows the end user or the installer to configure which characters are displayed on the screen from the inputs of the 512008 cable; and whether or not the inputs from the 512008 cable are active high, active low, or any given mixture. Reference Figure 36:

On-Screen Display Options Screen Shot

Figure 36

Main Display Options

An asterisk beside the item indicates that the item in question will be shown on-screen during normal operation. Pressing the SEL button when the cursor is set to a particular line toggles the asterisk on or off.
Reference: Figure 37.

Main Display Options Screen Shot

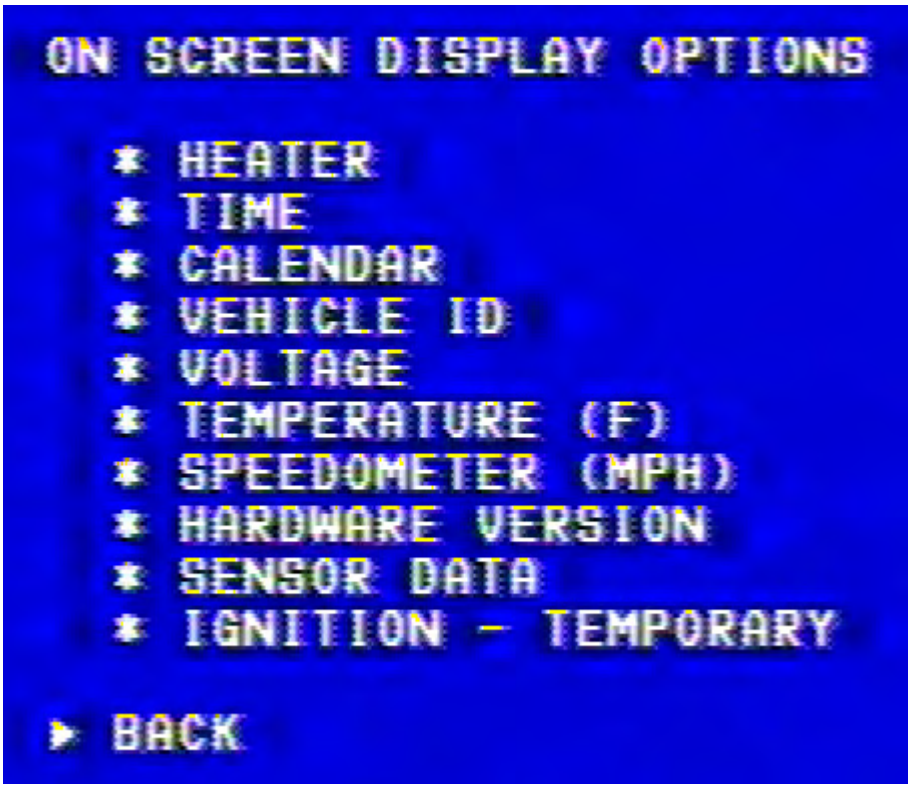


Figure 37

- **HEATER** An 'H' in the corner if the heater is on.
- **TIME** Current time.
- **CALENDAR** Current date.
- **VEHICLE ID** Programmable Vehicle ID.
- **VOLTAGE** System voltage.
- **TEMPERATURE** Temperature inside cabinet (°C or °F).
- **SPEEDOMETER** Bus Speedometer (MPH, KMH, or KTS).
- **HARDWARE VERSION** Differentiates Newer DVRs with a "v4".
- **SENSOR DATA** Warning lights, brakes, stop-arm, etc.
- **IGNITION** Disabled, Temporary, & Continuous Display.

GPS Display Options

An asterisk beside the item indicates that the item in question will be shown on-screen during normal operation. Pressing the SEL button when the cursor is set to a particular line toggles the asterisk on or off.
Reference: Figure 38.

GPS Display Options Screen Shot

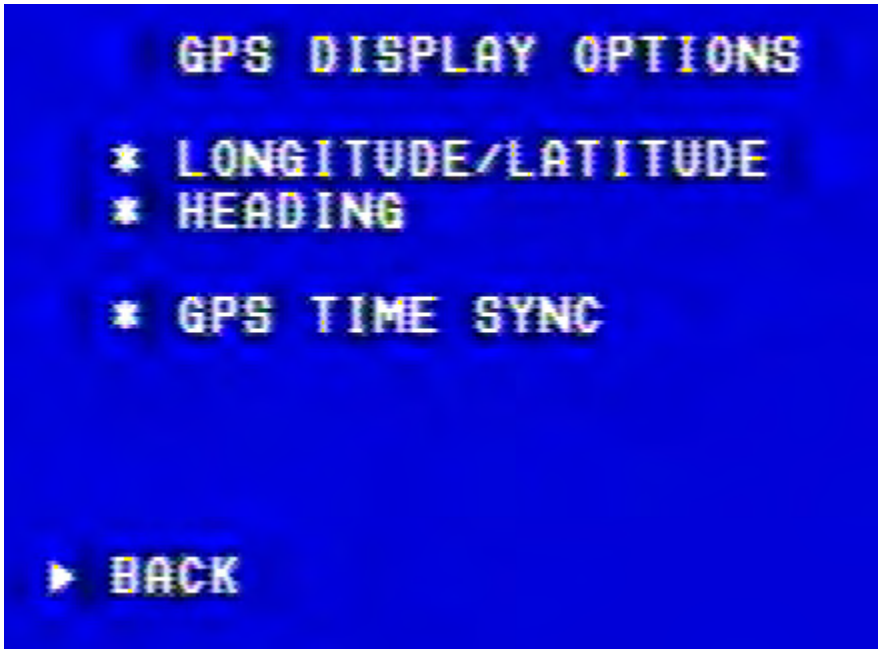


Figure 38

- **LONGITUDE/LATITUDE** Displays the current vehicle co-ordinates on top of the screen.
- **HEADING** Displays the current Heading above the speed reading at the bottom of the screen, if the vehicle is moving.
- **GPS TIME SYNC** Synchronizes the minutes and seconds of the real time clock to the GPS time upon each time the vehicle is started.

Vehicle Sensor Options

This item takes you to another screen that allows you to change how and in what way the vehicle sensor inputs are displayed. The Sensor Level Options allow you to change the input from active high to active low, and the Character Display Options allow you to change what wire colors create which characters are displayed on the screen. Reference: Figure 39.

Vehicle Sensor Options Screen Shot

Figure 39

Sensor Display Options

This item takes you to another screen that allows you to determine what characters are displayed on the recorded video for the vehicle sensor options. The two main options to choose from are Transit and School Bus, Transit being the default setting. Because of the wide variety of vehicles on the road, a custom sensor setting is also provided to allow for users to connect the options wires to any point in the vehicle that needs to be monitored. In the Custom mode, use the Arrow and SELect keys on the front panel of the unit to change the on screen display letters to suit the specific installation. Reference: Figures 40-42.

Vehicle Sensor Display Options Screen Shot – School Bus Settings

Figure 40

Vehicle Sensor Display Options Screen Shot – Transit Settings

Figure 41

Vehicle Sensor Display Options Screen Shot – Custom Settings

Figure 42

Sensor Level Options

This item takes you to another screen that allows you to determine how the characters that are displayed on the screen are activated. The default settings for these inputs are active high. That means that when the input signal goes from ground (or 0 volts dc), to a high level (5-12 volts dc), the character as mapped on the Character Display Options Menu is created on the screen. The user has the option here to change the input logic from active high to active low, which registers the character to the screen when the input wire is grounded. This gives the installer latitude when finding the proper signals to connect the Vehicle Sensor Options Harness (REI P/N 512008), and avoid situations such as having the 'B' for brakes on the screen when the brakes are off and vice-versa. Reference: Figure 43.

Vehicle Sensor Input Level Options Screen Shot

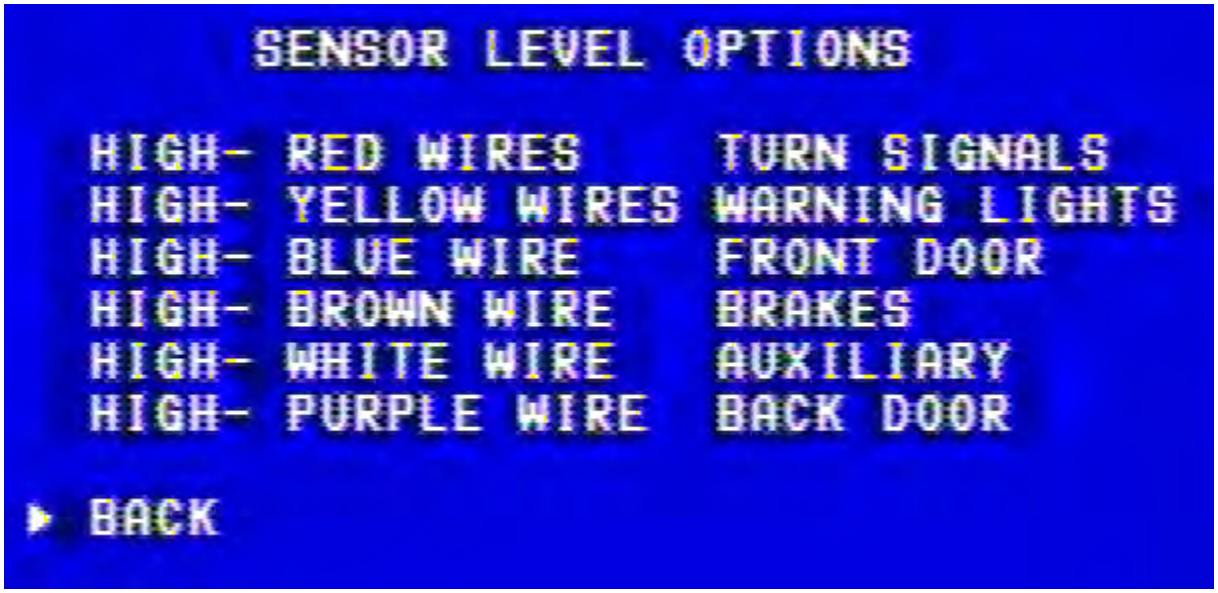

SENSOR LEVEL OPTIONS
HIGH- RED WIRES TURN SIGNALS
HIGH- YELLOW WIRES WARNING LIGHTS
HIGH- BLUE WIRE FRONT DOOR
HIGH- BROWN WIRE BRAKES
HIGH- WHITE WIRE AUXILIARY
HIGH- PURPLE WIRE BACK DOOR
BACK

Figure 43

Playback Options

This item takes you to another screen that allows you to easily search the contents of the Hard Drive for the video you are looking for. You can search by the first video recorded on any given day (DATE), the first record recorded video in any given hour (HOUR), or search by the alarm triggered events that were set up in the ALARM RECORDING OPTOINS screen (ALARM). Reference: Figure 44.

Playback Search Options Page Screen Shot

Figure 44

Recording Options

This item takes you to another screen that allows you to access the options that relate to the recording quality. Use the arrows and SEL buttons to select the items as desired. The recording quality of the Digital BUS-WATCH® IV has three independent settings: REC MODE, REC FPS, and REC QUALITY. Reference: Figure 45.

Recording Options Page Screen Shot

Figure 45

RECORD MODE: Can be set to either FRAME or FIELD. This sets whether the unit is recording video fields, or full frames. Frames require more disk-space per image, so they reduce recording time but provide a better quality image. Fields reduce video quality but increase recording time.

RECORD QUALITY: This setting corresponds to the compression ratio of the video data. There are four options: SUPER, HIGH, NORMAL, and BASIC. SUPER gives the best quality image but reduces the length of recording time. BASIC gives the longest recording time, but the recorded image quality is reduced.

FRAME RATE: Has many different options, ranging from 0.5P to 60P. The number equates to fields or frames per second. The four cameras share the frame rate, so at 60P, each camera saves 15 fields per second.

These three settings all have a significant effect on recording capacity of a given hard drive. Below is a chart giving the approximate recording capacity of a 120GB drive at each of the above settings. Drives of larger sizes have proportionally larger recording capacities.

Note: *These numbers can vary significantly with a color vs. black-and-white camera, frame composition, and light level. This table is representative of 4 color cameras. A system using a black and white cameras generally has a slightly higher recording capacity.*

Hours of Recording Time with a 120 GB Hard Drive

FPS / Quality	Field 0.5P	Frame 0.5P	Field 1P	Frame 1P	Field 2P	Frame 2P	Field 4P	Frame 4P
Basic	10368	5760	5184	2880	2592	1440	1296	720
Normal	7776	4320	3888	2160	1944	1080	972	540
High	5184	2880	2592	1440	1296	720	648	360
Super	2592	1440	1296	720	648	360	324	180

FPS / Quality	Field 8P	Frame 8P	Field 15P	Frame 15P	Field 30P	Frame 30P	Field 60P	Frame 60P
Basic	648	360	346	192	173	96	86	48
Normal	486	270	259	144	130	72	65	36
High	324	180	173	96	86	48	43	24
Super	162	90	86	48	43	24	22	12

Figure 46

RECORD TRIGGER: When set to 'IGN', the command to start or stop recording comes from the ignition switch (system switch). When this feature is set to 'TIMER', the command to start or stop recording comes from the programmable timers as shown in Figure 45.

OFF DELAY: Can be set to any number from 0 to 99. This is the number of minutes the Digital BUS-WATCH® IV will to record after the System Switch has been turned off. The default for this setting is 0 minutes. ***Note:*** *This function only works in MANUAL Record Mode (see below). Off delay is not used if the unit is configured to use the programmable timers.*

Overwrite Menu

Overwrite Menu Screen Shot

Figure 47

AUTOREVERSE: When this function is set to ON, the Digital BUS-WATCH® IV will record continuously. When the hard drive is full, the recording "loops" around to overwrite the oldest data as it records new data. When this function is set to OFF, the recording will stop when the hard drive is full. If this setting is selected to OFF and the DVR has recorded a full hard drive's worth of video, the user must execute the ERASE DRIVE to allow the DVR go through another record cycle.

ERASE DRIVE: This function is used to reset the Hard Drive Record Marker, which is the drive address that the DVR will start writing the video information to. If the user has set up the DVR to Auto-Reverse Off, the DVR will record from the

beginning of the drive to the end and then stop. Use this setting to clear the drive for another record cycle. To do this, set the function to ON, then exit the Recording Options menu. Upon exiting the menu, the Hard Drive Record Marker will be reset.

Warning: *Executing the ERASE DRIVE command is irrevocable! Do NOT set this function to ON unless you are sure. Once it is completed, the unit will not be able to access video information previously stored on the hard drive.*

Alarm Record Menu

The Alarm Record Menu is the main configuration menu for the adjustable record rate setup. The Alarm Trigger Options tell the DVR what makes the change in record rate, and the Alarm Record Options tell the DVR what Frame Rate to change to and for how long. The Audible Alarm Options give the user warning options for various troubleshooting situations.

Alarm Recording Menu Screen Shot

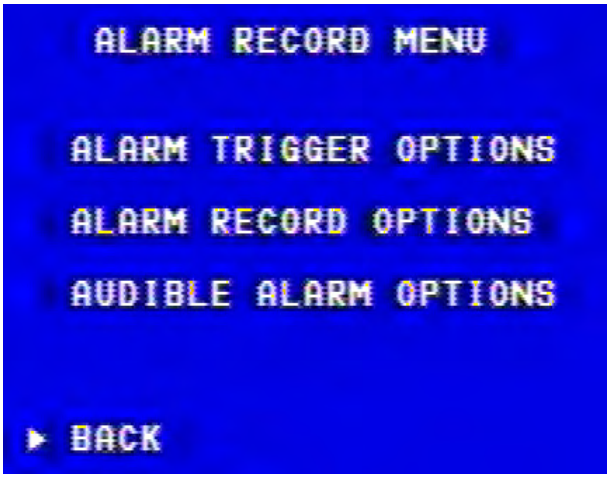


Figure 48

Alarm Trigger Options

This item takes you to another screen that allows you to customize what activates the alarm record option. An asterisk beside the item indicates that the item in question will create an event in the database that is stored on the hard drive. Pressing the SEL button when the cursor is set to a particular line toggles the asterisk on or off.
Reference: Figure 49. (Shown using the Transit Character Display Option)

Alarm Trigger Options Screen Shot

Figure 49

Alarm Record Options

Alarm Record Options Screen Shot

Figure 50

ALARM FRAME RATE: This function is used to set the frame rate of the DVR during an active Alarm event. After an Alarm Event is triggered (See Alarm Options for more details on Event Triggering), the DVR could be set to record at a different frame rate than it normally runs at. This feature could allow a user to have substantially more record time than listed on any of the high quality video settings alone. An example would be if the DVR was set at REC FPS: 4P (4 fields per second) as a normal slide show recording for non-event video, and set at ALARM FPS: 60P, and ALARM REC: 30 MIN, for 30 minutes for Alarm Event Recording. Using this setting, the user of the DVR could expect to have high quality video during the event, and not waste hard drive space on non-eventful recording. Reference Figure 50.

RECORD DURATION: This function is used to set the amount of time that the DVR records at the ALARM FPS frame rate. Time options include 1, 5, 10, 15, 20, 25, 30 minutes, and Continuous.

SIGNAL DURATION: This function is used to set the amount of time that the DVR sounds the audible alarm after the alarm trigger event. Time options include 1, 5, 10, 15, 20, 25, 30 minutes, and Continuous.

Audible Alarm Options

This item takes you to another screen that allows you to customize what activates the audible alarms. An asterisk beside the item indicates that the item in question will create a beeping alarm when this event occurs. Pressing the SEL button when the cursor is set to a particular line toggles the asterisk on or off. Reference: Figure 51.

Audible Alarm Options Screen Shot

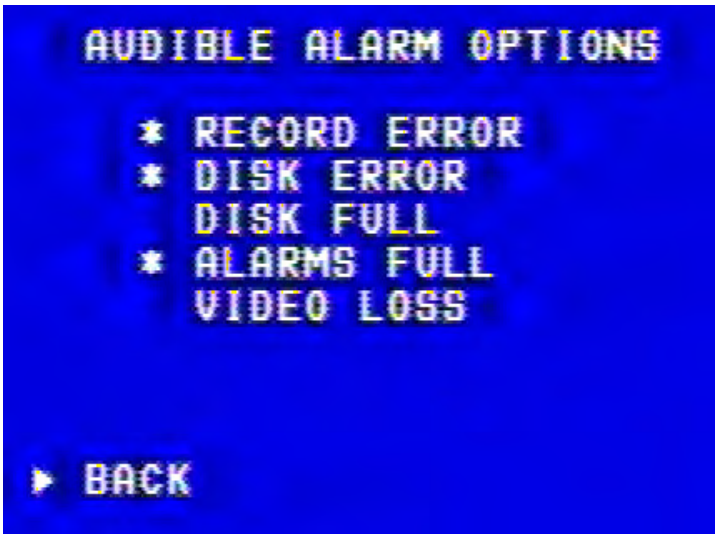


Figure 51

RECORD ERROR: This function is activated when the Master Controller PCB can not communicate with the Video PCB, generally characterized by failure of the Video PCB or the ribbon bale connecting the 2 PCBs together.

DISK ERROR: This function is activated when the Video PCB can not store the video, audio, and database information to the drive. This alarm can be heard as a beep, for a bad sector or track, or a constant tone for a lack of a working drive.

DISK FULL: This function is activated when the Hard Disk Drive reaches the physical end of the drive. This function will turn on the audible alarm for a second, then continue on to the beginning of the drive and start recording video over again. No frames of video are lost during this transmission.

ALARMS FULL: This function is activated when the number of panic button presses stored on the drive is 255. This audible alarm indicates to the user that further panic button presses will not mark the drive. The marked events are overwritten in a first in – first out method and the alarm goes off when there are less that 255 events.

VIDEO LOSS: This absolute function is used when there at least 4 cameras connected to the DVR. The Video Loss audible alarms have 2 modes, one absolute and one conditional. The conditional Video Loss alarm determines the number of cameras connected to the system at the time of the ignition, and sounds an alarm if one or more of the cameras stops producing video during normal operation. The absolute function sounds an alarm any time it is not seeing all 4 video signals.

Overwriting Video

First-In, First-Out

The Digital BUS-WATCH® IV DVR records video in a FIFO (First-In First-Out) manner. The oldest video is overwritten by the newest video. When the DVR is stopped by manually using the STOP button on the face of the recorder, and then sent into playback mode by pressing the PLAY button, the DVR always goes to the oldest recorded video. By pressing the rewind button, REW, the DVR will play back the newest video in reverse order.

Overwrite Protection

The Digital BUS-WATCH® IV DVR does not allow for Overwrite Protection on video events. This avoids the situation of having all the video space on the hard drive being marked as ‘protected’, and not having enough room to store any new events. In order to assure that the last recorded video will be present on the drive, without having to have the user ‘manually clear the events’, the video is only kept on the drive until overwritten. Video being overwritten is the only way to remove video from the drive, there is no erase function otherwise. In situations that require extended video record time for event preservation, the user has several options. One option is to use the

FIELD setting in the Recording Options Menu (REC MODE). The Digital BUS-WATCH® IV DVR uses Hardware Field Doubling technology that doubles the amount of record time without much degradation in audio/video quality. Other options include changing the Recording Options to reduced frame rates (REC FPS) or increasing digital video compression (REC QUALITY). Another option is to use the Alarm Frame Rate Recording options as described above. Other options include using larger sized hard drives.

Set Record Timers Screen

An example of the timer screen is shown in Figure 52. There are ten timers, labeled T0 through T9. Each timer shows the day of the week when it is active, the start time, the stop time, and the Enable setting. The **Y**es means that this timer is enabled. A **N**o indicates that the timer is disabled.

Record Timers Page Screen Shot

T0 MO 7:00A 7:45A Y
T1 MO 3:00P 4:15P Y
T2 TU 7:00A 7:45A Y
T3 TU 3:00P 4:15P Y
T4 WE 7:00A 7:45A Y
T5 WE 3:00P 4:15P Y
T6 TH 7:00A 7:45A Y
T7 TH 3:00P 4:15P Y
T8 FR 7:00A 7:45A Y
T9 FR 3:00P 4:15P Y
PRESS "MENU" TO RESET DEFAULTS
▶ EXIT

Figure 52

Use the arrow keys and the SEL button to select the timer. The parameter being changed, whether it is weekday, start hour, stop minute, etc., will flash. First, select the day you wish this timer to operate. You can choose any day of the week or the "MF" setting, which causes the timer to work on every weekday, Monday through Friday.

All timers should be set up in advance. Any timer that is not used should be disabled by setting it to 'No' **(N).**

DIGITAL BUS-WATCH® IV CD-ROM

Remote Viewer Software

The CD-ROM contains:

- An electronic copy of this manual in PDF format. It requires Adobe Acrobat Reader®.
- The REI Viewer Software, which is used when downloading images to a PC from the Digital BUS-WATCH® IV.
- Product Pictures, Specifications, & Diagrams.

Downloading images to a PC via the serial cable requires the REI Viewer Software. This software must be installed on the PC before attempting to download any images.

To install the Single Image Download Software

- Insert the CD-ROM into the drive.
    - If your Computer is set to AUTOPLAY, the Explore Menu will come up automatically.
- Using Windows® Explorer or My Computer, view the contents of the CD-ROM drive.
- Open the Folder named: REI VIEWER SETUP.

For Windows® 95, 98, & XP:

- Open the Folder named: WIN-95-98-XP.
- Double-click the file named SETUP.EXE. The software will install automatically.

For Windows® 2000 & Windows® NT:

- Open the Folder named: WIN-2000-NT.
- Double-click the file named SETUP.EXE. The software will install automatically.

NOTE: *In some PCs, some of the PC's system files may be outdated. The installation of the REI Viewer software will recognize if this is the case, and attempt to update those files. For the REI Viewer software to function, you must allow the installation to update those files.*

Digital BUS-WATCH® IV Systems Related Part Numbers

Digital Video Recording & Playback Units

710000	Digital Bus-Watch® IV, Under-seat Mount
710000FM	Digital Bus-Watch® IV, Floor Mount
710005	Digital Bus-Watch® IV Viewing Station

Hard Drives

710020	DBW4 120 GB Hard Drive Module
710060	DBW4 160 GB Hard Drive Module
710012	DBW4 Reprogramming Module

Quad Video Processors

700483	12V Black & White Quad Processor
700848	12V Color Quad Processor

Camera Switch Devices

710030	2 Camera Solid State Switch Device

Digital Bus-Watch® IV System Harnesses

512001	DBW4 Power Cable, 35 Feet
512002	DBW4 Power Cable, 16 Feet
512008	DBW4 Vehicle Sensor Options Cable, 30 Feet
511986	DBW4 External Record Indicator / Event Mark Cable, Aftermarket, 20 Feet
512023	DBW4 External Record Indicator / Event Mark Cable, Aftermarket, 40 Feet
512024	DBW4 External Record Indicator / Event Mark Cable, OEM, 20 Feet
512025	DBW4 External Record Indicator / Event Mark Cable, OEM, 40 Feet
710010	DBW4 GPS Antenna Module, 16 Feet
750086	Bus-Watch® Magnetic Pickup Vehicle Speed Sensor Kit

Digital Bus-Watch® Camera Harnesses

512014	Bus-Watch® Camera Cable, 1 Foot
511007	Bus-Watch® Camera Cable, 5 Feet
511411	Bus-Watch® Camera Cable, 6 Feet
511158	Bus-Watch® Camera Cable, 12 Feet
511970	Bus-Watch® Camera Cable, 15 Feet
511965	Bus-Watch® Camera Cable, 20 Feet
510781	Bus-Watch® Camera Cable, 25 Feet
511966	Bus-Watch® Camera Cable, 30 Feet
511967	Bus-Watch® Camera Cable, 35 Feet
511968	Bus-Watch® Camera Cable, 40 Feet
510993	Bus-Watch® Camera Cable, 50 Feet
511969	Bus-Watch® Camera Cable, 60 Feet
510804	Bus-Watch® Camera Extension Cable, 5 Feet
511465	Bus-Watch® Camera Extension Cable, 10 Feet

Digital Bus-Watch® II to Digital Bus-Watch® IV Transfer Harnesses

512015	Bus-Watch® Vehicle Sensor Options Transfer Harness, BW to DBW4
512017	Bus-Watch® Power Transfer Harness, BW to DBW4
512018	Bus-Watch® External Record Signal Transfer Cable, DBW2 to DBW4
512026	Bus-Watch® Event Signal Transfer Cable, DBW2 to DBW4

Cube Cameras

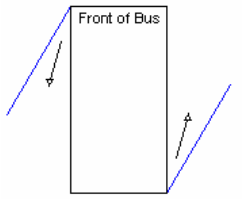
700552	Black & White 8mm Adjustable Iris
700555	Black & White 4mm Adjustable Iris
700578	Color 8mm Adjustable Iris
700793	Black & White 8mm Fixed Iris
700820	Black & White 8mm Adjustable Iris with Conduit
700843	Color 4mm Adjustable Iris
700859	Black & White 6mm Fixed Iris
700888	Color 6mm Fixed Iris
700904	Color 4mm Fixed Iris
700908	Color 8mm Fixed Iris

Dome Cameras

710009	Dome Camera, Color 2.9mm
710004	Dome Camera, Color 4mm
710008	Dome Camera, Color 8mm
710019	Dome Camera, Black & White 2.9mm
710014	Dome Camera, Black & White 4mm
710018	Dome Camera, Black & White 8mm
710023	Dome Camera, Color Dual Lens - 4mm & 8mm

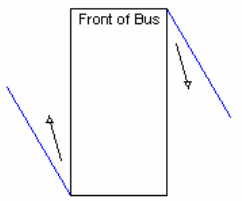
Exterior Wedge Cameras – Roadside Rear Facing / Curbside Front Facing

710006	Exterior Wedge Camera, Color 4mm
710031	Exterior Wedge Camera, Color 6mm
710032	Exterior Wedge Camera, Color 8mm
710001	Exterior Wedge Camera, Black & White 4mm
710034	Exterior Wedge Camera, Black & White 6mm
710036	Exterior Wedge Camera, Black & White 8mm



Exterior Wedge Cameras – Roadside Front Facing / Curbside Rear Facing

710003	Exterior Wedge Camera, Color 4mm
710026	Exterior Wedge Camera, Color 6mm
710007	Exterior Wedge Camera, Color 8mm
710002	Exterior Wedge Camera, Black & White 4mm
710033	Exterior Wedge Camera, Black & White 6mm
710035	Exterior Wedge Camera, Black & White 8mm



Please Visit www.radioeng.com for a complete product catalog.

Typical Camera Lens Viewing Angles

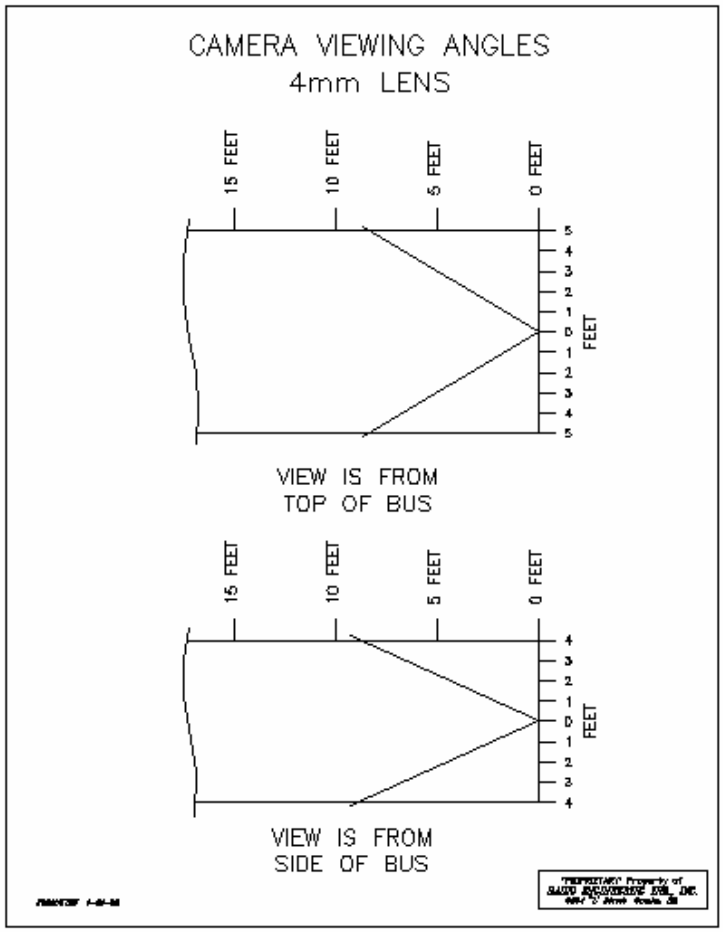


Figure 53

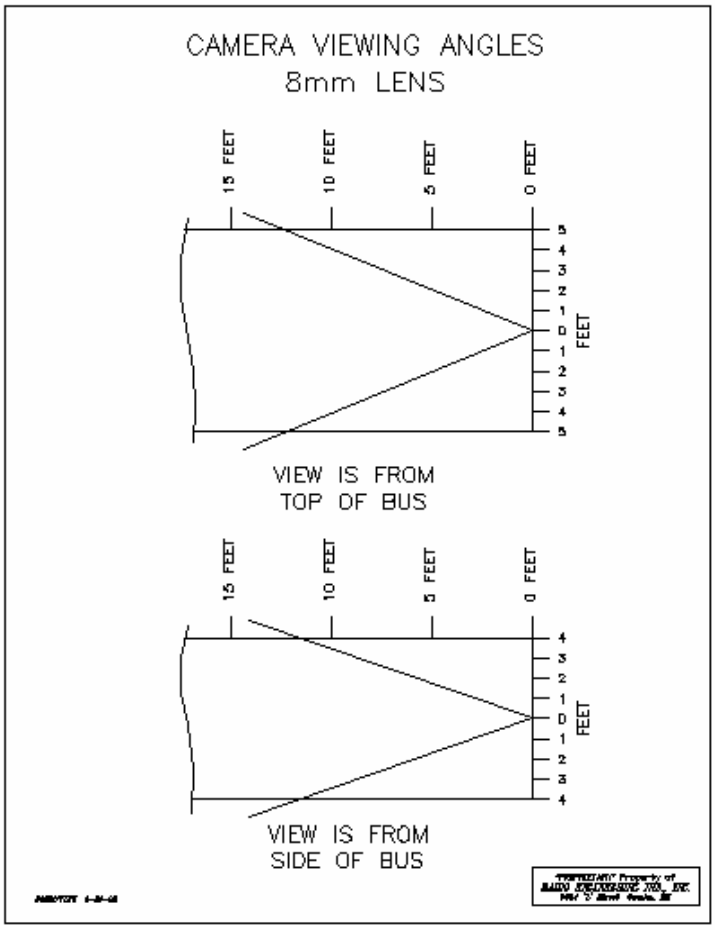


Figure 54

Specifications

Digital BUS-WATCH® IV Security Cabinet (main unit)

Size (with slide bracket)	
Height	6 inches maximum
Width	11-1/4 inches maximum
Depth	15-1/2 inches maximum
Weight (with bracket)	21 lb. 14.5 oz.
Weight (without bracket)	17 lb. 4.5 oz.
Power Consumption (@ 12V DC)	
Standby	48 mA Max
Recording	1.3 A Max
Rewind or FF	1.5 A Max
Heater	2.5 A Max
Greatest Draw	4 A Max
Max Consumption	48W
Operation Temperature	-40°C to +65°C
Operating Humidity	10%-75%

Cube Cameras

Image Device	1/3 inch
Focal Lengths	2.9 - 8 mm
Angle of view (D x H x V)	40.1' x 32.6' x 24.7' (8mm)
Luminance Sensitivity	0.1 Lux
Electronic Iris	1/100,000 sec
Power Supply	12VDC
Power Consumption	145 mA at 12VDC
Height	3 inches
Width	3 inches
Depth	3 inches
Weight (with bracket)	20.7 ounces

Slide Bracket

Height	1.23 inches
Width	9.76 inches
Depth	13.34 inches
Weight	5 lb. 2 oz

DVR Specifications

Format	NTSC or PAL Standard (Factory Setting)
Resolution	720 x 486 pixels (NTSC) or 720 x 576 (PAL)
Recording Options	48 Different Settings
Playback Scanning Speed	Up to 650x
Video Output	1.1Vp-p, 75 Ohm unbalanced
Audio Output	-5dBm, 600 Ohm unbalanced
Digital Compression	Proprietary Wavelet
Search Features	Search by: Date, Hour, & Alarm Events